

SOIL SURVEY

Tunica County Mississippi



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How to Use THE SOIL SURVEY REPORT

FARMERS who have worked with their soils for a long time know about soil differences on their own farms, at least in a general way, and perhaps about soil differences on the farms of their immediate neighbors. What they do not know, unless soil surveys have been made, is how nearly their soils are like those on experiment stations or other farms, either in their State or in other States where farmers have gained experience with new or different farming practices or enterprises. They do not know whether the higher yields obtained by farmers in other parts of their county and State are from soils like theirs, or from soils so different that they cannot hope to get yields as high, even if they follow the same practices. Learning what kind of soil one has, so that it can be compared with soils on which new developments have proved successful, will remove some of the risk and uncertainty involved in trying new methods and new crops or varieties.

SOILS OF A PARTICULAR FARM

All of the soils in Tunica County are shown on the map that accompanies this report. To learn what soils are on a farm or any tract of land, it is first necessary to locate it on the map. To do this find the general locality of the farm, and then use such landmarks as roads, streams, villages, dwellings, and similar features to locate its boundaries.

The next step is to identify the soils on the farm. Each kind of soil is marked on the map with a symbol, for example, Dk. All areas marked Dk are the same kind of soil. Look at the Color Grouping legend on the map and find Dk. This soil identifies a soil—Dundee silt loam, level phase. All areas of this soil, wherever they occur on the map, will have the same symbol and the same color.

To find what this soil is like, turn to the section, Soil Series, Types, and Phases and find Dundee silt loam, level phase. There, following the name of the soil, will be found a description of it, its principal use, and some of the uses for which it is suited.

How productive is Dundee silt loam, level phase? The answer will be found in table 3. Find Dundee silt loam, level phase, in the left-hand column, and read, in the columns opposite, the yields of differ-

ent crops it can be expected to produce. Compare these yields with those given in the table for other soils of the county.

The section, Soil Management, explains the general principles of managing the soils of Tunica County and how combinations of management practices can be fitted to each soil. The soils are grouped according to their management requirements, and specific measures are suggested for the soils of each group. Table 4 groups the soils of Tunica County according to their management requirements. It will be found that Dundee silt loam, level phase, is listed under group 1 among the most productive soils of the county. Management practices are suggested.

SOILS OF THE COUNTY AS A WHOLE

A general idea of the soils of the county will be found in the section, Soil Series and Their Relations. This tells where the principal kinds are found, what they are like, and how they are related to one another. The section, Soil Associations, will tell how different kinds of soils tend to be arranged in different localities. These patterns will often be associated with recognized differences in type of farming and land use. Study the soil map as you read this section and notice the arrangement of the different soils in different parts of the county.

A newcomer to the county, especially if he considers purchasing a farm, will want to know about the climate, the types and sizes of farms, the principal farm products and how they are marketed, the kinds and conditions of farm tenure, availability of churches, schools, roads, railroads, telephone and electric services and water supplies, industries, and towns and population characteristics. This information will be found in the sections, General Nature of the Area, and Additional Facts About Tunica County.

Those interested in how the soils of the county were formed and how they are related to the great soil groups of the world should read the section, Genesis, Morphology, and Classification of Soils.

This publication on the soil survey of Tunica County, Miss., is a cooperative contribution from the—

SOIL CONSERVATION SERVICE

and the

MISSISSIPPI AGRICULTURAL EXPERIMENT STATION

SOIL SURVEY OF TUNICA COUNTY, MISSISSIPPI ¹

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United States Department of Agriculture in cooperation with the Mississippi Agricultural Experiment Station

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¹ Contributions were made by W. H. Allaway, and the report was revised by A. H. Hasty and Marvin Lawson, all of Soil Survey, United States Department of Agriculture.

² Field work was done while Soil Survey was part of the Bureau of Plant Industry, Soils, and Agricultural Engineering. Soil Survey was transferred to the Soil Conservation Service on November 15, 1952.

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TUNICA COUNTY lies between the Mississippi and Coldwater Rivers. It has always been subjected to floods, but after protective levees were built, it became a productive agricultural area with much land in large plantations. From the beginning, cotton has been the leading crop; corn, oats, soybeans, hay, and pasture occupy smaller areas.

In recent years the agriculture of the county has undergone a transition. Improved methods and machinery are being developed constantly through the agricultural research programs of the Mississippi Agricultural Experiment Station and the United States Department of Agriculture, and new practices are also being developed on some of the farms. The soil survey of Tunica County will be helpful in adjusting these new soil management and land use practices to the soils of each field. The survey shows in detail the distribution of all the different kinds of soils in the county. The people of Tunica County recognized the need for this survey and voted a special tax appropriation to help pay for it.

The various soils in the county differ in suitability for different crops and in response to management practices. Some of these differences have been recognized by local people for a long time. For example, heavy clay soils, locally called buckshot soils, present problems that are well known. There are, however, other important soil differences that are not so widely recognized. To provide more detailed information about soils and their best agricultural uses, this soil survey was made cooperatively by the United States Department of Agriculture and the Mississippi Agricultural Experiment Station. Fieldwork was completed in 1942, and, unless otherwise specifically mentioned, all statements in this report refer to conditions at that time.

METHODS USED IN THE SOIL SURVEY OF TUNICA COUNTY

Soil scientists walked over each field in the county and examined the soils frequently by boring holes with an auger or by digging with a spade. They also studied exposures of soil in banks, roadcuts, and pits.

Each boring or hole revealed a series of distinct layers. These are called *horizons* and collectively form the soil *profile*. The A horizon consists of the surface soil and subsurface soil; the B horizon, the subsoil; and the C horizon, the parent material from which the soil has formed. Arrangement and thickness of the different layers or horizons help to characterize the soil.

Properties such as texture and color usually vary in the different layers, or horizons, of the soil. The surface layer is usually darker in color than lower layers, and in lower layers mottling is usually greater than in the surface soil. The characteristics that follow were considered by the soil scientist.

Texture.—The content of clay, silt, and sand in a soil determines its texture. Texture is first judged by the feel and to some extent by the appearance of the soil and may be later checked mechanically by laboratory analysis. The finest particles in the soil are clay. Individual clay particles are so fine that they can scarcely be seen with a microscope. Soils that consist principally of clay are usually sticky when wet and rather hard when dry. Water moves slowly through clay soils; they retain moisture and plant nutrients well.

Medium-sized particles, large enough to be seen with a microscope, are called silt. Silty soils are smooth and velvety; they are not so hard when dry nor so sticky when wet as clay soils.

The largest particles in the soil are called sand. Individual sand particles can be seen with the naked eye. Water moves rapidly through sandy soils; and they retain relatively little water for plants. For this reason, extremely sandy soils are droughty.

Structure.—This is the arrangement of individual soil particles into aggregates. When dry, some soils are loose and crumbly; others can be broken down into small blocklike clods; and still others have small platelike pieces. The structure of a soil determines how air, water, and plant roots penetrate it.

Color.—Other soil properties are indicated by color. Dark-colored soils are usually high in organic matter, and, other things being equal, are more productive and more easily tilled than light-colored ones. Color also indicates drainage. In Tunica County, well-drained soils are usually brown, grayish brown, or yellowish brown; poorly drained soils have subsoils that are gray or are mottled with gray and reddish brown.

Drainage.—Wetness of an area and the color of the soil and its position in the landscape are factors that indicate drainage. In Tunica County there is a wide variation in drainage, and this variation is a major cause of the differences in crop suitability. The terms used to denote the successive grades of soil drainage are *excessively drained*, *well drained*, *moderately well drained*, *imperfectly drained*, *poorly drained*, and *very poorly drained*.

Chemical properties.—Acidity and other chemical properties indicate the way in which the soils were formed and how productive they may be.

Topography or lay of the land.—Definite combinations of soil profile characteristics are usually associated with the topography. Certain soils are always found on gently undulating natural levees; others are always in depressions.

Different combinations of these soil characteristics are the basis for separating one soil from another. In determining the kinds of soil to be mapped in the county, combinations of soil properties were emphasized that are important to crop production and soil management. The kinds of soil were then classified into soil series, types, and phases.

A *soil series* is a group of soils that, except for the texture of the surface soil, have similar characteristics within the soil profile. All soils of the same series have developed from the same kind of parent material. Variations in slope or in other features external to the soil profile are permitted so long as these variations do not affect the profile characteristics. Each series is given a name, which is usually taken from the locality where the series was first recognized. Sharkey, Forestdale, and Dubbs are the names of important soil series in Tunica County.

A *soil type* is a subdivision of a soil series. The texture of the surface soil determines the number of soil types in a series. There may be one or more types in a series, because soil types are differentiated from one another on the basis of the texture of the surface soil. Thus, Dubbs very fine sandy loam and Dubbs silt loam are soil types within the Dubbs series.

Variations within the soil type—chiefly in such external characteristics as relief, stoniness, accelerated erosion, or depth of surface soil—are designated as *soil phases*. Dubbs very fine sandy loam, level phase, and Dubbs very fine sandy loam, undulating phase, are examples of phases originating from slope conditions in Tunica County.

At times, different kinds of soils are so intricately associated that it is impossible to map them separately. Such areas are called *complexes*, and the complexes are named for the soils they contain. Sharkey-Alligator clays, level phases, is the only complex mapped in Tunica County.

The term "miscellaneous land types" is used in soil classification and mapping for areas of land that have little or no natural soil, that are too nearly inaccessible for examination, or that for other reasons cannot feasibly be classified and mapped in detail. Riverwash is a miscellaneous land type in Tunica County consisting of islands in the Mississippi River or of very low elevations on the bank of the river.

The process of assigning uniform names to soils of various areas is called *soil correlation*. This is a part of the nationwide system of mapping and classifying soils. Its purpose is to show similarities and differences among the soils of each surveyed area and the rest of the United States. To do this the same combination of soil characteristics is given the same name, wherever found. Unlike soils must not be given the same name.

Soils do not change abruptly at county or State lines. Many of the soils of Tunica County are found also throughout the Mississippi Delta from Cape Girardeau, Mo., to the Gulf of Mexico. Valuable information about the use and management of these soils may be developed in other counties or States. This is especially true of some of the newer practices. For example, the experiences of ricegrowers in Louisiana and Arkansas can be used by the farmers of Tunica County to best advantage if the soils used for growing rice in Louisiana and Arkansas can be compared with the soils in Tunica County. By assigning the same name to the same soil wherever mapped, such comparisons of soils and exchange of experiences are made easier.

To work out the best correlation and naming of the soils of each area, it is necessary to make continuing studies of the soils over wide areas. As new information comes to light, and better methods of mapping are discovered, it is often desirable to narrow the range of properties of an established soil series. For example, at one time most of the clayey soils of the Delta area were included in the Sharkey series. With modern mapping techniques, however, it became possible to subdivide the Sharkey soils of older surveys into several newer series, each with distinctive properties and soil-use problems. As a result the Sharkey soils shown on the map accompanying this report represent a narrow range of properties, in contrast to the wide range of properties shown by Sharkey soils in some of the old surveys of the Delta.

Each phase, complex, undifferentiated unit, and miscellaneous land type recognized in the county was given a number, and every member of the survey party was provided with a list of these numbers and a description of the soil designated by the number. As the surveyors walked over the fields and examined the soil, they sketched on aerial photographs the boundaries of the area occupied by each of the combinations of soil characteristics. They placed the proper number in each area. The areas thus delineated are landscapes where most of the factors affecting plant growth are essentially uniform.

When mapping was completed, the maps were checked thoroughly and the correlation of the soils was reviewed. Arrangements were then made to give each farmer in the county a copy of the aerial photograph field map of his own farm. Bulletin 381 of the Mississippi Agricultural Experiment Station (3)³ was published for distribution

³ Italic numbers in parentheses refer to Literature Cited, p. 86.

with these field sheets and explains how they can be used in planning a soil-management program for each farm.

At the time the colored map that accompanies this report was prepared, soil boundaries and cultural features were transferred from the individual field sheets to an accurate base map of Tunica County. The numbers used in field mapping were changed to letter symbols better suited for use on the large map. The color scheme was worked out by soil scientists familiar with the county and shows the topographic position and soil drainage.

If you are interested in a more detailed discussion of the methods used in soil survey work, consult the Soil Survey Manual (13).

GENERAL NATURE OF THE AREA

LOCATION

Tunica County is in the northwestern corner of Mississippi in the Delta area bordering the Mississippi River (fig. 1). The Coldwater River, on the opposite side of the county, forms part of its eastern boundary.

CLIMATE

Tunica County has a continental, humid, warm-temperate climate. Summers are hot and sultry, and winters are moderate. Table 1, compiled from records at the United States Weather Bureau station at Austin, gives normal, seasonal, and annual temperatures and precipitation considered representative for the county. As shown in this table, the average summer temperature is 79.4° F., and the average winter temperature is 44.4°.

During summer there are droughty spells when temperatures stay high all day and night. In winter, temperatures above 70° are common, but there are also short erratic cold spells that come suddenly. Temperatures may drop 60° or more in a few hours. The cold spells seldom last longer than a week.

Pronounced local variation in rainfall occurs throughout the county. Some areas have an abundance and others a shortage. The average annual rainfall is 51.7 inches, and the average snowfall has been 3.3 inches. The droughts in summer often appreciably reduce yields of corn and hay. In most years farming is delayed by a wet spring.

The average date of the last killing frost in spring is April 25, and the first in fall is October 11. The average growing season is 220 days.

Hailstorms and tornadoes do not come often, but they have occurred in many parts of the county. Normally they affect limited areas, but their destruction is usually great.

VEGETATION

At the time of the first settlement, Tunica County was entirely covered by forest and canebrakes. Except for swampy areas filled with dense stands of cypress, most of the forest consisted of hardwoods. Hickories, pecan, post oak, water oak, blackgum, and winged elm grew on the higher elevations. In the low places where water remained most of the year there was tupelo gum, sweetgum, overcup oak, willow oak, soft elm, maple, green ash, hackberry, and cottonwood. Cane grew tall and luxuriant in the broad flats along the

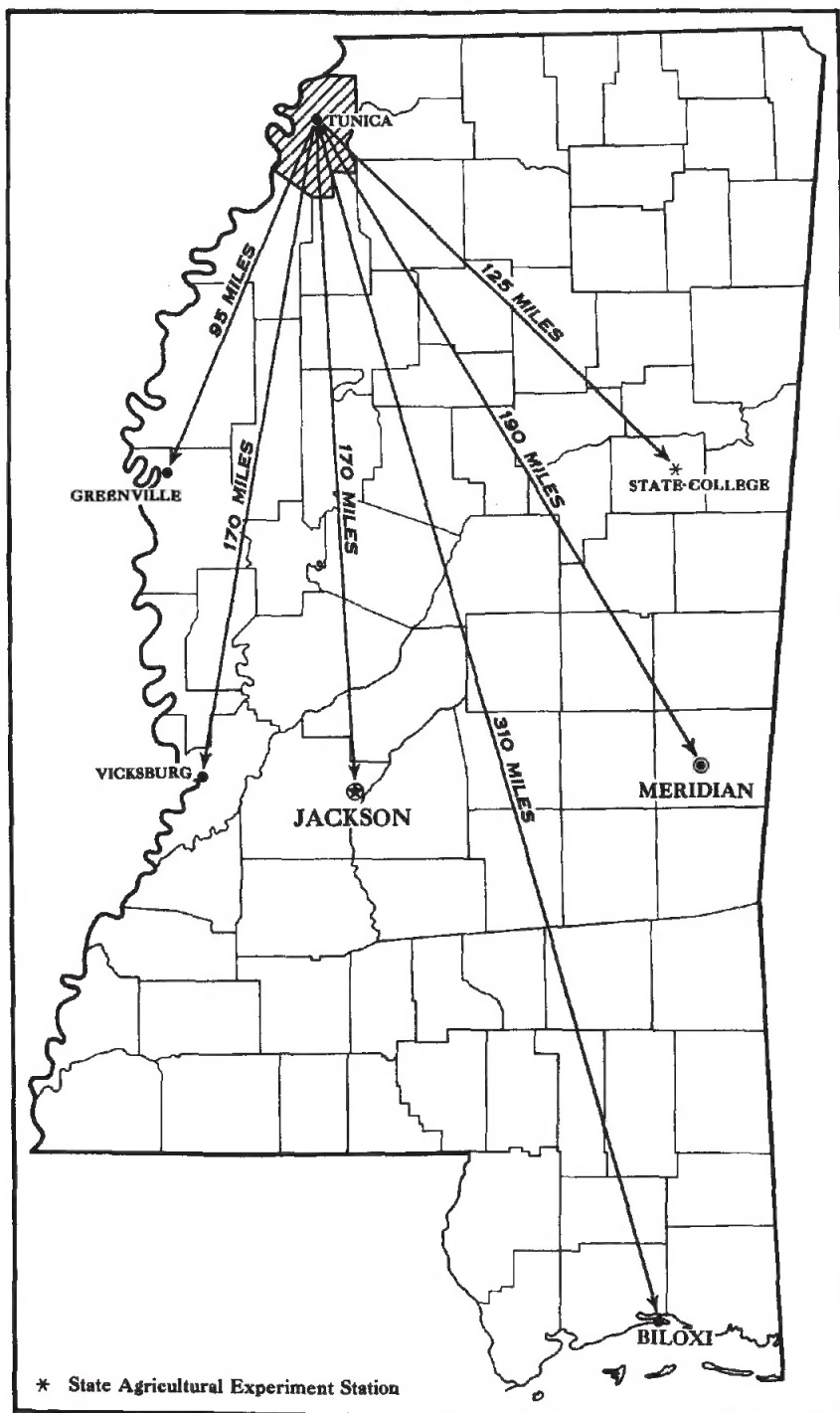


FIGURE 1.—Location of Tunica County in Mississippi.

bayous and sloughs. In general, differences in native vegetation were associated with differences in drainage.

TABLE 1.—*Normal monthly, seasonal, and annual temperature and precipitation at Austin, Tunica County, Miss.*

[Elevation, 200 Feet]

Month	Temperature ¹			Precipitation ²			
	Average	Absolute maximum	Absolute minimum	Average	Driest year	Wettest year	Average snowfall
	°F.	°F.	°F.	Inches	Inches	Inches	Inches
December.....	44.3	80	-2	5.60	2.37	8.97	0.8
January.....	43.4	79	-7	5.48	6.00	6.34	1.3
February.....	45.6	82	-9	4.10	.90	1.55	.9
Winter.....	44.4	82	-9	15.18	9.27	16.86	3.0
March.....	54.2	90	16	5.82	5.00	5.42	.2
April.....	62.4	95	27	5.26	2.25	2.45	(³)
May.....	70.2	98	33	4.13	1.42	3.77	0
Spring.....	62.3	98	16	15.21	8.67	11.64	.2
June.....	77.8	106	46	3.80	4.20	1.77	0
July.....	80.6	108	53	3.81	5.10	8.93	0
August.....	79.7	105	53	3.35	2.25	4.07	0
Summer.....	79.4	108	46	10.96	11.55	14.77	0
September.....	74.5	100	36	2.96	.95	7.41	0
October.....	63.3	95	25	2.90	1.05	2.67	0
November.....	52.9	87	13	4.52	5.16	19.78	.1
Fall.....	63.6	100	13	10.38	7.16	29.86	.1
Year.....	62.4	108	-9	51.73	⁴ 36.65	⁵ 73.13	3.3

¹ Average temperature based on 37-year record, 1896 to 1932; highest and lowest temperatures on a 35-year record, 1896 to 1930.

² Average precipitation based on 37-year record, 1896 to 1932; wettest and driest years based on 38-year record, from 1895 to 1933; snowfall, based on a 36-year record, 1895 to 1930.

³ Trace.

⁴ In 1895.

⁵ In 1906.

PHYSIOGRAPHY, RELIEF, AND DRAINAGE

The county is gently undulating to level. Except for a small area on the extreme eastern edge, it is a wide river flood plain. Most of the county was subject to overflow from the Mississippi River until the present levee was built on the west side in 1884. A narrow strip on the east side of the county once subject to overflow from the Coldwater River is now protected by levees and drainage structures. All

natural drainage of the county, except for a narrow strip near the Mississippi River, flows eastward and southeastward to the Coldwater River.

The entire county consists of sediments deposited by rivers. The Mississippi River has brought in material from the vast areas of the North Central United States; that is, the area drained by the Missouri, Mississippi, and Ohio Rivers and their tributaries. The Coldwater River has brought in silt from the Loess Hills section and some sand and clay from underlying beds.

On bottom lands, materials usually are coarse textured on the natural levees or ridges near the stream, progressively finer textured and more level away from the streams, and finally clay and silty clay on the level, poorly drained backwaters. This is the pattern in Tunica County.

SOIL SERIES AND THEIR RELATIONS

In Tunica County variations in soil texture are caused principally by differences in the rate at which sediments settle from floodwaters. At flood stage a stream moves rapidly. Sediments remain suspended in the water until after the stream has overflowed its banks and has slowed down; then the sediments begin to settle. Sand and coarse materials are deposited soon after the water leaves the streambank. Therefore, alongside the stream we find natural levees made up of coarse-textured sediments. These areas are usually higher than the surrounding flood plain. As the waters flow back from the river over the valley floor, they move more slowly and eventually come almost to a standstill. In the areas where water stands the longest, the finer sediments, mainly clay particles, are deposited.

The natural levees and the stream bed itself finally are built up to a height above the backswamps and the surrounding flood plain. Then, if the river reaches flood stage, it may break from its channel and cut a new course in the lower parts of the flood plain. After the river has become established in this new course, the process is repeated as sediments carried by its waters again begin to build up levees along the channel.

Thus, over a period of time, a large valley such as the Mississippi Valley becomes interlaced by old abandoned channels of the main stream. Each of these old channels lies between natural levees; the levees grade into the poorly drained backswamp areas. In Tunica County natural levees are found along the Whiteoak and Tee Bayous, as well as along present channels and old beds of the Mississippi and Coldwater Rivers (fig. 2).

Levees that border present channels constantly receive new material from the river; older natural levees no longer receive material and have become weathered. Most of the soils of the county can be placed in four main groups:

1. Soils of the recent natural levees.
2. Soils of the old natural levees.
3. Soils of the slack-water or backwater areas.
4. Soils of the depressions.

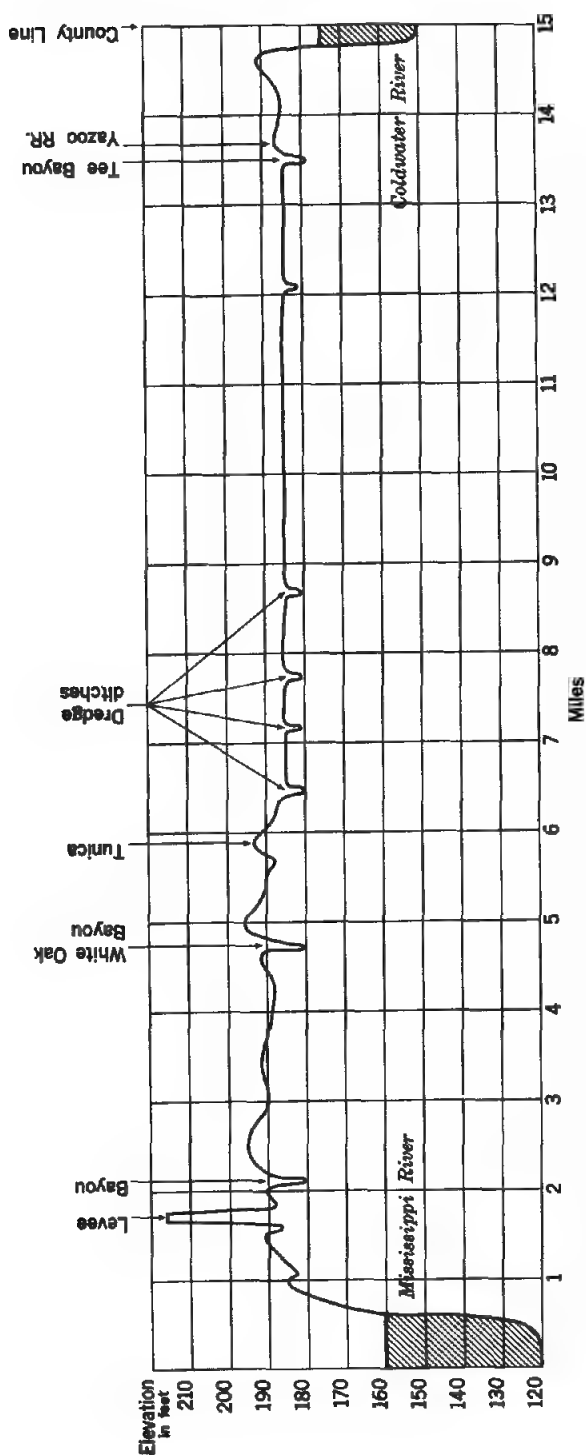


FIGURE 2.—Cross section of Tunica County showing elevations of various bayous, natural levees, and low bottom areas.

SOILS OF THE RECENT NATURAL LEVEES

On recent natural levees, variations in soil characteristics usually can be traced to differences in texture of sediments deposited there and to differences in drainage. The alluvial sediments making up these areas have been in place for such a short time that only the first stages of soil development have taken place. Materials left by the river contain lime, so they are alkaline. The soils are usually alkaline or neutral because they have not had time to become leached. They are generally light colored because organic matter has not had time to build up. Some are poorly drained. It takes only a short span of years for gray and mottled horizons to form in poorly drained soils, and some of the soils that are waterlogged part of the year are mottled.

Soils of the recent natural levees are described in the section, Soil Series, Types, and Phases. They consist of the Crevasse soils close to the channel; the Robinsonville soils back of the Crevasse soils and farther from the channel; the Commerce, Bowdre, and Collins soils; and finally, the Mhoon soils that grade into the backswamp areas.

The area between the Mississippi River and the levees is designated on the map as Alluvial soils (unclassified). In this area soils may be changed each year as they are shifted by overflow waters from the river.

Not all of the recent natural levees have the entire sequence described above. Often, at least one of the members of the sequence is missing, and in some levees only one or two members of the sequence are found.

SOILS OF THE OLD NATURAL LEVEES

On the old natural levees, a sequence of soils is found that is in many ways similar to the sequence on recent natural levees. On the old levees, however, the soils have weathered for some time without fresh alluvium being added. Because of similarities in the two sequences, soil-profile characteristics found in the old levees but not found in the recent ones are important in differentiating the soils.

Floodwaters no longer add fresh sediment to the old natural levees, and excess lime has been removed from them by the downward movement of rainwater through and out of the soil. As a result, the soils of the old natural levees range from slightly to strongly acid. More organic matter is in these soils than in the soils of the more recent levees because native plant residues have accumulated over a period of years. Some clay may have been moved from the surface into the subsoil by the downward moving waters; consequently, differences between surface soil and subsoil are usually more pronounced in these older soils. In some ways the soils of the old natural levees represent a transition from the soils of the recent natural levees to the soils of the upland bluffs bordering the Mississippi flood plain.

The soils of the old natural levees are the Clack, Bosket, Dubbs, Dundee, and Forestdale soils. Many of the old natural levees, however, do not have the complete texture-drainage sequence represented by these soils. A description of these soils is given in the section, Soil Series, Types, and Phases.

SOILS OF THE SLACK-WATER OR BACKWATER AREAS

On the low bottoms of the Delta in areas once covered by quiet floodwaters, sediments high in clay have been deposited. The soils, locally called buckshot soils, have developed from fine-textured sediments under conditions of slow drainage. All of these soils have fairly slow drainage and fine texture, so a well-defined sequence of soils similar to that found on the natural levees is not so evident. To some extent, differences among soil series of slack-water or backwater areas result from differences in the thickness of the fine-textured slack-water sediments deposited on the sandier strata underneath. The Tunica, Sharkey, Alligator, Dundee, and Commerce soils, as well as Clay soils (unclassified), are found in these areas.

SOILS OF THE DEPRESSIONS

Shallow depressions occur in a winding pattern throughout the Delta. They provide channels for the slow return of floodwaters to the main channel and the bayous.

The depressions sometimes cut across recent or old natural levees or areas of slack-water sediments; therefore, soils developed in the depressions occur in close association with soils of the other three groups. Soils of the Ark, Souva, Dowling, Alva, and Eupora series are mapped in the depressions.

MISCELLANEOUS LAND TYPES

Five units are mapped as miscellaneous land types.

A unit called Clay and sand banks, gently sloping, occurs on the old streambanks of this area. A second unit, called Clay and sand banks, sloping, is mapped on banks that have slopes above 15 percent. A unit called Riverwash is mapped as islands in the Mississippi River and also occurs in places bordering the river. Riverwash is subject to frequent change, and an area may be built up or entirely destroyed by one flood.

Sand banks, sloping, is a unit mapped along banks of former bayous and river channels. This is the only miscellaneous unit used to any extent for farming, but crop yields are low.

Borrow pits are also mapped in this group.

SOIL ASSOCIATIONS

A soil association is a group of defined and named taxonomic soil units, regularly geographically associated in a defined proportional pattern (*13*). The association may consist of only a few soils or of many. The soils may be similar, or they may represent a number of different types; they may vary widely or have only slight differences. In each soil association, however, there is always a certain uniformity of pattern. Usually the principal members of an association occur in every delineated area, but minor members are not always found.

The soils of Tunica County have been grouped for representation on a small-scale map into five soil associations, which are named for the predominant soil series occurring within them. Each association consists of the dominant series for which it is named and other series that are not so extensive but that are related to the dominant series.

Distribution of soil associations in Tunica County is shown in figure 3. On a map of the scale used, it is impossible to show small areas of the different groups of soils. In particular, the soils of depressional areas could not be delineated. Nevertheless, this map does show the broad distribution of recent natural levees, old natural levees, and areas of slack-water sediments and the relationship of major streams to soils of the county.

The uses of soil association maps differ from those of detailed soil maps. Soil association maps do not provide enough information to make them suitable for the study of individual farms or for the planning of individual farm operations. They do give a picture of the soils of larger areas such as communities, counties, or States. They are useful in making regional studies of agricultural production, forestry, or water conservation. Each of the five Tunica County associations shown on the map (fig. 3) is discussed separately in the following pages.

COMMERCE-ROBINSONVILLE ASSOCIATION

This soil association consists mostly of nearly level to rolling sandy or silty Commerce and Robinsonville soils, but it includes smaller areas of heavy, or buckshot, soils. About 8.5 percent of the county is in this association. Much of it lies between the levees and the Mississippi River where crop production is uncertain on account of overflow. A very large part of it is still in forest.

Commerce and Robinsonville soils are among the best in the county for general farm crops. The Crevasse soils are excessively drained, and crops on them suffer for lack of moisture if the growing season is at all dry. The somewhat poorly drained Mhoon and the moderately well drained Bowdre soils are heavy textured and difficult to till.

Most of this association is well suited to cotton, corn, alfalfa, annual legumes, and small grains. Some large farms in the association are used for raising beef cattle.

BOSKET-DUBBS-DUNDEE-FORESTDALE ASSOCIATION

The Bosket-Dubbs-Dundee-Forestdale association is found principally on low terraces of the Mississippi River where the soils are not subject to ordinary overflow. Over most of the area the soils are acid, although a few areas of Sharkey soil may be neutral. In addition to the Bosket, Dubbs, Dundee, and Forestdale soils, there are a few small areas of Clack, Sharkey, and Tunica soils. The Clack soils are excessively drained, the Bosket well drained to excessively drained, the Dundee and Tunica moderately well drained, the Forestdale somewhat poorly drained, and the Sharkey poorly drained. A large part of the association is moderately well drained and well drained.

Soils of the Bosket-Dubbs-Dundee-Forestdale association are mostly good for agriculture. In a few places the more poorly drained soils are injured by local floods in wet seasons. The Clack soils are droughty except in early spring or during wet seasons. The acreage of wet soils and droughty soils is small. The Sharkey soils are fine textured and difficult to till except in a narrow moisture range, but

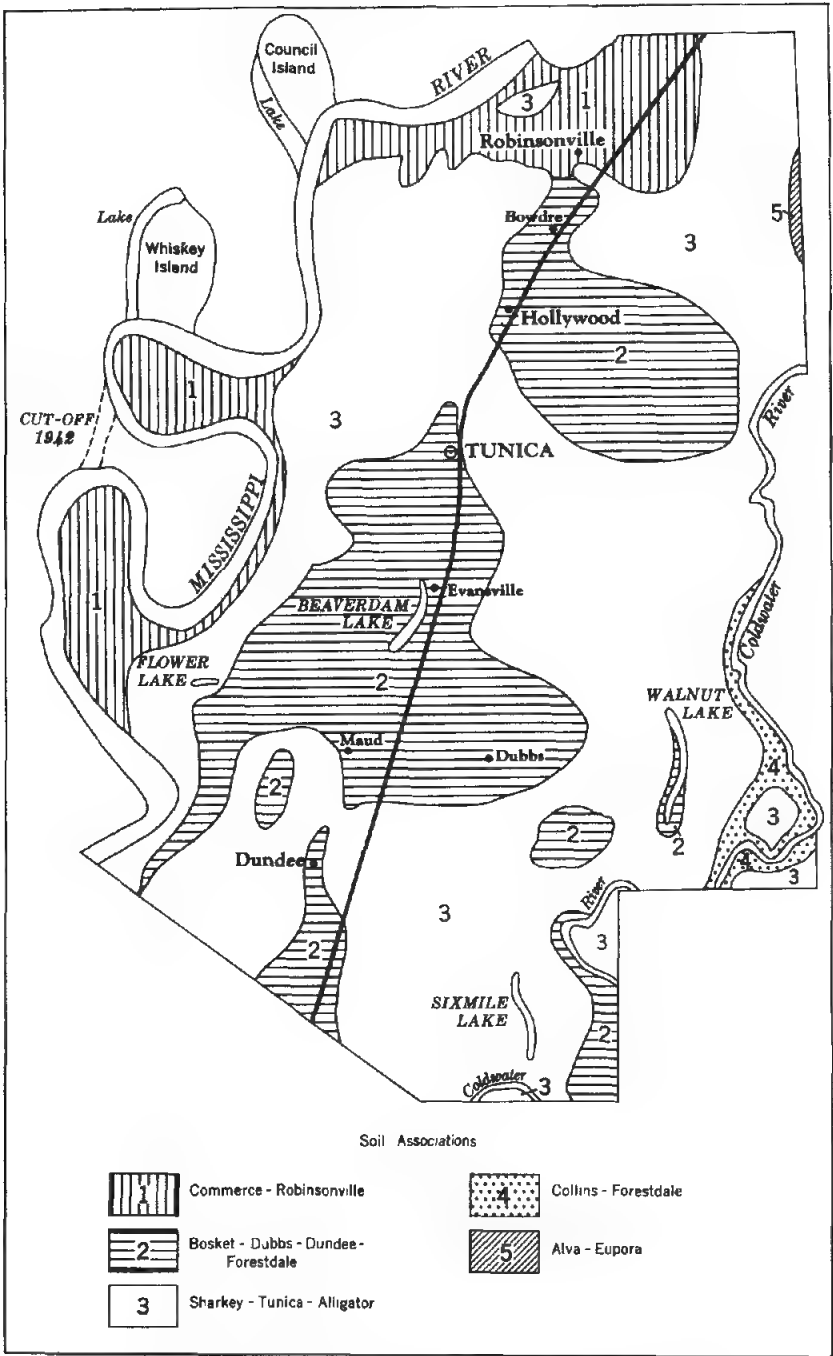


FIGURE 3.—Soil association map of Tunica County, Miss.

the Bosket, Dubbs, and Dundee soils are easily tilled over a fairly wide range of moisture conditions.

Cotton, corn, soybeans, oats, and pasture are among the crops grown on this association. If properly limed, the moderately well drained and well-drained soils will produce fair to good alfalfa.

SHARKEY-TUNICA-ALLIGATOR ASSOCIATION

This association covers a larger area than any of the others. It is made up of soils of the slackwater or backwater areas. Some large areas of the association are still in timber, but if drained and properly managed they would be moderately to highly productive. Drainage is not always easy to accomplish, however, because a lower outlet is difficult to obtain when floods are general. Some large drainage projects have been set up on these soils, and others are being built. If not protected by levees, these soils are subject to overflows of backwater from the larger streams.

Typically, the soils are fine textured, and tillage is difficult except within a somewhat narrow range of moisture conditions. Cotton and soybeans are the principal crops. Alfalfa is produced in some areas where drainage is adequate.

COLLINS-FORESTDALE ASSOCIATION

The Collins-Forestdale association covers a small area on the southeastern side of the county along the Coldwater River. The Collins soils occupy first bottoms. The materials from which they are derived were washed from loessal uplands and deposited by floodwaters of the Coldwater River. The Forestdale soils occupy terrace positions; they were derived from stratified Mississippi River alluvium.

Soils of this association are moderately well drained to somewhat poorly drained. They need protection from floods, and in places drainage would be helpful. They are used for cotton, soybeans, corn, and pasture. Yields are fair to good except in wet seasons.

ALVA-EUPORA ASSOCIATION

The Alva-Eupora association covers a small acreage on the eastern edge of the county. It occurs at the foot of loessal bluffs where an overwash of brown loam from the bluffs has been deposited on sandy and clayey material of the Coastal Plain. These soils range from moderately well drained to somewhat poorly drained. They are used for cotton, soybeans, corn, annual hay, and pasture.

SOIL SERIES, TYPES, AND PHASES

In the following pages, the soil series of Tunica County are described in alphabetical order. Following the general description of each series is a description of the mapping units in that series. The acreage and the proportionate extent of the soils mapped are given in table 2. A summary of the most important characteristics of each soil series will be found in the supplement to the soil map in the jacket that contains this report.

TABLE 2.—*Approximate acreage and proportionate extent of the soils mapped in Tunica County, Miss.*

Soil	Acres	Percent
Alluvial soils (unclassified).....	1, 080	0. 3
Alligator clay:		
Level phase.....	3, 200	1. 2
Undulating phase.....	640	. 2
Alva and Eupora soils.....	320	. 1
Ark soils.....	1, 920	. 7
Bosket very fine sandy loam:		
Level phase.....	10, 880	4. 0
Undulating phase.....	1, 920	. 7
Borrow pits.....		(1)
Bosket sandy loam:		
Level phase.....	3, 200	1. 2
Undulating phase.....	2, 560	1. 0
Bowdre soils.....	960	. 4
Clack loamy sand:		
Level phase.....	400	. 2
Undulating phase.....	1, 840	. 7
Clay and sand banks:		
Gently sloping.....	2, 240	. 8
Sloping.....	960	. 4
Clay soils (unclassified).....	30, 720	11. 5
Collins silt loam.....	960	. 4
Commerce silt loam and very fine sandy loam.....	4, 480	1. 7
Commerce silt loam, shallow phase.....	320	. 1
Crevasse sandy loam:		
Level phase.....	100	(1)
Undulating phase.....	220	(1)
Dowling soils.....	2, 560	1. 0
Dowling silt loam and clay loam.....	1, 280	. 5
Dubbs silt loam and very fine sandy loam:		
Level phases.....	1, 920	. 7
Undulating phases.....	640	. 2
Dubbs very fine sandy loam:		
Level phase.....	2, 880	1. 0
Undulating phase.....	960	. 4
Dundee silt loam:		
Level phase.....	5, 280	2. 0
Undulating phase.....	1, 600	. 6
Dundee silt loam and very fine sandy loam:		
Level phases.....	10, 240	3. 9
Undulating phases.....	2, 560	1. 0
Dundee very fine sandy loam, level phase.....	480	. 2
Dundee silty clay loam:		
Level phase.....	2, 560	1. 0
Undulating phase.....	2, 880	1. 0
Forestdale silt loam:		
Level phase.....	3, 840	1. 4
Undulating phase.....	160	(1)
Forestdale silty clay loam-clay:		
Level phases.....	5, 280	2. 0
Undulating phases.....	4, 160	1. 6
Mhoon silt loam.....	640	. 2
Mhoon and Sharkey soils.....	700	. 3
Riverwash.....	200	(1)
Robinsonville silt loam and very fine sandy loam.....	1, 920	. 7
Sand banks, sloping.....	320	. 1
Sharkey clay, undulating phase.....	5, 120	2. 0

See footnote at end of table.

TABLE 2.—*Approximate acreage and proportionate extent of the soils mapped in Tunica County, Miss.—Continued*

Soil	Acres	Percent
Sharkey silty clay loam:		
Level overwash phase.....	400	0.2
Undulating overwash phase.....	300	.1
Sharkey-Alligator clays, level phases.....	38,900	14.6
Sharkey and Dowling clays.....	36,620	13.7
Souva silt loam:		
Level phase.....	9,280	3.5
Gently sloping phase.....	1,600	.6
Tunica clay and silty clay:		
Level phases.....	8,960	3.4
Undulating phases.....	7,520	2.8
Tunica and Dundee soils:		
Level phases.....	1,600	.6
Undulating phases.....	160	(¹)
Tunica, Commerce, and Sharkey soils.....	1,800	.7
Total acreage mapped.....	234,240	87.7
Acreage between levee and river not mapped.....	33,280	12.3
Total.....	267,520	100.0

¹ Less than 0.1 percent.**ALLUVIAL SOILS (UNCLASSIFIED)**

Alluvial soils (unclassified) (0 to 20 percent slopes) (Ac).—This unit covers large wooded areas between the levees and the Mississippi River. It is frequently overflowed in spring and early in summer. The unit consists of a wide variety of soils and soil materials; textures range from clay to sand. Most areas are well drained, but some are poorly drained or somewhat poorly drained.

The soils range from slightly acid to alkaline. Most of the areas have slopes of less than 5 percent, but some streambanks that have slopes ranging up to 20 percent are included. Many very large borrow pits are also included. The dominant soils in this mapping unit are the Crevasse, Robinsonville, and Commerce, but many others are represented.

In most places this unit would be good for crops if it were protected from floods. Occasionally, farmers have cleared and cultivated the land in spite of the flood hazard. Such cleared areas have been mapped into other units. Most of the land, however, is considered undesirable because of floods; furthermore, the Corps of Engineers, United States Army, uses it for levee work, and large areas may be needed for borrow pits.

ALLIGATOR SERIES

The Alligator series consists of fine-textured, poorly drained soils of the backswamps or slack-water areas. Except for a thin top layer of dark, decaying organic matter, their surface layer is grayish brown over a light-gray subsoil that is prominently mottled with shades of

gray, yellow, and brown. In early soil maps, the Alligator soils were included with the Sharkey soils.

Alligator clay, level phase (0 to 2 percent slopes) (AA).—This is a medium-acid soil derived from light-colored, heavy-textured Mississippi alluvium. Surface runoff is slow, and movement of water through the soil is slow to very slow. The soil usually occurs in nearly level, low, slack-water areas on the flood plain; locally it is called low-bottom or buckshot land. This soil usually is found in the eastern part of the county in close association with soils of the Sharkey, Tunica, and Forestdale series. The natural forest cover consists of redgum, blackgum, tupelo gum, tuliptree, hickory, willow, cypress, pecan, and various kinds of water-tolerant oaks. There is a heavy undergrowth of brush and vines.

Profile in a forested area:

- 0 to 6 inches, grayish-brown clay with weakly developed medium to fine blocky structure; has about a half-inch covering of decaying leaves, twigs, and bark, mainly from deciduous trees; medium acid.
- 6 to 30 inches, light-gray clay usually strongly mottled with shades of gray, yellow, and brown; very plastic when wet, very firm when moist, and very hard when dry; moderately developed medium to coarse blocky structure; medium acid.
- 30 to 36 inches +, light-gray clay mottled with various shades of gray, brown, and yellow; medium acid.

In a few small areas there is a thin overwash of silty or fine sandy material. When first cleared the soil has a fairly high content of organic matter. This disappears rather rapidly if manure crops are not planted. Wide deep cracks are very noticeable in the soil during long dry seasons.

Alligator clay, level phase, is lighter colored and usually more acid than the associated Sharkey and Tunica soils, and is generally finer textured than the Forestdale soils. It is more uniformly grayish brown or gray than Sharkey-Alligator clay, level phases.

Alligator clay, level phase, is lighter colored and more acid than the associated Sharkey and Tunica soils, and is generally finer textured than the Forestdale soils. It is more uniformly grayish brown or gray than Sharkey-Alligator clay, level phases.

Use and management.—Cotton is the chief crop, but some soybeans, oats, and corn are grown. Yields of cotton and soybeans are fairly high if seasons are not too wet; yields of corn and oats are usually rather low.

Drainage is a problem because it is difficult to obtain outlets low enough to carry off floodwaters. Open ditches generally are used to remove excess water. Organic matter should be added to the soil whenever feasible, but winter cover crops are hard to grow because of floods and winterkilling.

Alligator clay, undulating phase (2 to 5 percent slopes) (AB).—This soil resembles the level phase of Alligator clay in important profile characteristics, although its profile is somewhat more variable. It has a similar parent material and the same native vegetation, and it occurs in the same general area of the county. It differs primarily in having undulating relief that in higher areas gives it slightly more rapid runoff and a little better internal drainage. Erosion is slight.

Use and management.—Cotton is the chief crop, but some areas are pastured or are used to grow soybeans, oats, and corn. Cotton and soybean yields are fairly high if the growing season is not too wet; corn and oat yields are generally low. Pastures are often damaged by floods.

It is difficult to obtain outlets for floodwaters, and drainage is usually through open ditches. Winter cover crops, which would improve the soil, are difficult to grow because of floods and winter-killing, but summer legumes such as soybeans and crotalaria are good manure crops.

ALVA AND EUPORA SERIES

The Alva and Eupora soils are found at the foot of the loessal bluffs on the east side of the county. It was not feasible to map them separately, because of their location, small area, and irregular size and shape.

Alva and Eupora soils (0 to 2 percent slopes) (Ad).—These soils consist of gravel and sand washed from the loessal bluffs on the east side of the county, and of silt washed from material capping the bluffs. They are on a narrow strip less than a thousand feet wide and about 2 miles long on the east side of the county at the base of the loessal bluffs. These soils are level to gently undulating.

Surface runoff is slow to medium, and internal drainage is medium to slow. Originally, these areas were covered by hardwood forests, but now all of them have been cleared and are farmed. The soils were low in organic matter, even at the time they were first cleared.

Profile of Alva very fine sandy loam:

- 0 to 10 inches, grayish-brown friable very fine sandy loam; strongly acid.
- 10 to 26 inches, yellowish-brown friable silt loam to very fine sandy loam containing a few soft dark concretions; if cut with a spade or crushed with an auger material shows stains of yellow and brown on the cut surface; strongly acid.
- 26 to 42 inches +, gray, brown, and yellow mottled silt loam; strongly acid.

Profile of Eupora loam:

- 0 to 10 inches, light-brown or pale-brown very friable silt loam to very fine sandy loam; medium to strongly acid.
- 10 to 18 inches, light brownish-gray, yellowish-brown, and very dark-brown very friable silt loam to very fine sandy loam.
- 18 to 30 inches, pale-yellow loam or sandy loam with numerous very dark-brown stains or small concretions; thickness varies considerably.
- 30 inches +, substratum of poorly assorted sandy and silty materials that contain some gravel in places.

Use and management.—Nearly all of this mapping unit is farmed. Cotton and corn are the principal crops, but some grains, and legumes such as soybeans and lespedeza, are grown. A few small areas are pastured.

Systematic rotation of crops, including use of manure crops, should be practiced more generally. The soils need phosphate and potash, and some areas require lime to counteract acidity. Drainage is needed in a few areas. Erosion is not a major problem, but protecting the soils from materials washed down from adjacent higher areas is sometimes difficult.

ARK SERIES

The Ark series consists of well-drained or moderately well drained alluvial soils derived from Mississippi River sediments. The total area of these soils is only about 2,000 acres. They occur in small, scattered, low swags or depressions in association with well-drained soils of the low terraces. As it was not feasible to map the different textures of the series, the soils were mapped simply as Ark soils.

Ark soils (0 to 4 percent slopes) (Ae).—These soils are medium acid to neutral. They usually are derived from Mississippi River sediments washed from nearby Bosket, Dubbs, and Robinsonville soils. The surface texture of the Ark soils varies from silt loam to sandy loam, and slopes range from level to gently sloping. Surface runoff is medium to slow, and internal drainage is medium. The native forest on these areas consisted of pine, white chestnut, swamp chestnut, oaks, pecan, redgum, tupelo gum, tuliptree, hornbeam, and a heavy undergrowth of brush, cane, and vines.

Profile description:

- 0 to 10 inches, dark-gray to dark-brown mellow friable silt loam to sandy loam; medium acid to neutral.
- 10 to 26 inches, dark-brown to very dark-brown friable silt loam to fine sandy clay loam; weak medium blocky structure; medium acid to neutral.
- 26 to 42 inches +, pale-brown to light yellowish-brown friable fine sandy loam to silt loam mottled with various shades of brown and gray; medium acid to neutral.

The content of organic matter is usually high. Tilth is good; plant roots can penetrate readily to a depth of several feet. Ark soils resemble the Souva soils in many ways but are darker and have better internal drainage.

Use and management.—Practically all of these soils are cultivated. They are very productive if adequate surface drainage is provided. Cotton, soybeans, corn, and, to limited extent, hay and small grains are grown on Ark soils. Some areas are pastured, and some are in home gardens. Most of this unit has been farmed for a long time. The principal need is adequate surface drainage to remove floodwaters. These soils are high in nitrogen, but phosphorus and potassium and possibly some minor elements should be added.

BORROW PITS

Borrow pits (Bp).—This mapping unit consists of excavations from which the soil and underlying material have been removed for the construction of artificial levees. During wet seasons these borrow pits are usually filled with water. They have no agricultural value.

BOSKET SERIES

The Bosket soils are found on old natural levees. They are well to somewhat excessively drained, but they store water well because the subsoil contains noticeably more clay than the surface layers. The Bosket soils are distinguished from the associated Clack and Dubbs soils by degree of sandiness, by their drainage, and to some extent by their position. They are not so sandy, loose, rolling, or droughty as the Clack soils. They are very similar to the Dubbs soils in surface features, but they are lighter textured and their subsoil is better

drained. Bosket soils are usually closer to the drains than the Dubbs soils.

Bosket very fine sandy loam, level phase (0 to 2 percent slopes) (Bc).—This soil occurs in nearly level areas. It is well drained, but it is not particularly droughty, because the clayey subsoil retains water.

Profile description:

0 to 8 inches, light brownish-gray very friable, very fine sandy loam; slightly acid; 6 to 10 inches thick.

8 to 24 inches, brown friable sandy clay loam to sandy loam; slightly sticky and plastic when wet, easily crumbled when moist, and slightly hard when dry; weakly developed moderately well defined blocky structure; slightly acid; 10 to 20 inches thick.

24 inches +, mainly a brown friable sandy loam but is a loamy sand in places.

Use and management.—This soil is very easily tilled and among the best in the county for crops that require good drainage. Cotton, corn, soybeans, oats, and alfalfa are grown, and some areas are pastured. The chief problem is to maintain fertility. A cover crop such as vetch or burclover should be planted in the fall. Soil samples may be sent to the Mississippi State College to be tested. Fertilizer requirements can be determined when results of the test are obtained.

Bosket very fine sandy loam, undulating phase (3 to 7 percent slopes) (Bd).—This soil occurs on old natural levees in association with Clack and Dubbs soils and other soils of the Bosket series. It resembles Bosket very fine sandy loam, level phase, in important profile characteristics but has stronger slopes and a more variable relief and is a little more droughty. It also resembles Dubbs very fine sandy loam, undulating phase, but has a somewhat coarser surface layer and a little better drainage.

Use and management.—Most of this soil is under cultivation. Cotton, corn, soybeans, oats, and alfalfa are grown, and some areas are pastured. Winter cover crops should be grown. Crops should be planted on the contour to control erosion. Soil samples may be sent to the State College to be tested in order to determine the need for fertilizer and supplements. Tillage is easy and is possible under a wide range of moisture content.

Bosket sandy loam, level phase (0 to 2 percent slopes) (Ba).—This soil occurs on low river terraces in association with other phases of the Bosket series and with Dundee, Clack, and Dubbs soils. It lies along old runs of the Mississippi River that are now marked by lakes and swamps. It usually occurs in the western part of the county, but small areas are in other parts. The original cover consisted of hardwoods such as red oak, white oak, chestnut oak, and live oak, pecan, hickory, sycamore, sweetgum, blackgum, wild cherry, and elm, and an undergrowth of cane and vines.

Profile in a cleared field:

0 to 10 inches, light brownish-gray or pale-brown very friable or loose sandy loam; weak fine granular structure; slightly acid.

10 to 40 inches, brown friable sandy loam; moderately fine granular structure; slightly acid.

40 inches +, pale-brown friable sandy loam or fine sandy loam mottled with gray and shades of yellow; slightly acid.

This soil is fairly easy to till under a wide range of moisture content. It approaches the more droughty Clack soils in texture. Some small areas have a silt loam texture. Sandblows—circular places 5 to 30 feet across—occur principally in the sandiest areas but have only a small total acreage. Both surface runoff and internal drainage are medium. This soil is a little more droughty than Bosket very fine sandy loam, level phase, but is less droughty than Bosket sandy loam, undulating phase.

Use and management.—The principal crop is cotton, but soybeans, oats, corn, and hay are grown. Except in very dry years, yields are good if crops are managed properly. Burclover and other winter legumes are good sources of the nitrogen needed by this soil. If alfalfa is to be grown, lime will be necessary.

Bosket sandy loam, undulating phase (2 to 5 percent slopes) (Bb).—This soil is associated with other phases of the Bosket series and with Dundee, Clack, and Dubbs soils. It is similar to Bosket sandy loam, level phase, in parent material, native vegetation, position, and significant profile characteristics. It has slightly greater slope, more variable relief, and a little more rapid drainage. This phase occupies a slightly higher position than the level phase. Surface runoff is medium, and internal drainage is medium to excessive, particularly in the sand boils and more sandy parts.

Use and management.—The principal crops are cotton, corn, soybeans, oats, annual hay, and alfalfa. Some areas are used for small home orchards and gardens. Crops yield fairly well if they are well managed. Some summer legumes and winter cover crops such as burclover should be grown. Samples of this soil should be tested in order to determine its requirements for fertilizers and supplements. Nitrogen fertilizer is needed for high crop yields.

BOWDRE SOILS

Bowdre soils (0 to 4 percent slopes) (Be).—These soils consist of very slightly acid silty clay loam to clay deposited by slack water over coarser materials such as silt loam, sand, or the two stratified. They are moderately well drained and have slow to medium runoff and medium internal drainage. Erosion is negligible. Usually these soils are adjacent to low natural levees in association with Tunica, Commerce, and Dubbs soils. They are widely distributed in small areas near the Mississippi River. The natural cover consisted of wetland deciduous trees and a heavy undergrowth of vines and canes.

Profile in a cleared field:

0 to 12 inches, very dark grayish-brown firm silty clay loam to clay; weak medium granular structure; plastic and sticky; medium to very slightly acid; 4 to 24 inches thick.

12 to 42 inches +, dark grayish-brown friable to loose silt loam to sand, faintly mottled with shades of brown and gray; medium to very slightly acid.

Bowdre soils are comparatively fertile. Surface layers are fairly high in organic matter. The soils have thinner beds of slack-water deposits than the associated soils. They are better drained and less alkaline than the Tunica soils and finer textured than the Commerce. They are more alkaline and have fewer horizons than the Dubbs soils.

Use and management.—Nearly all areas have been cleared and are used for crops. Cotton is the principal crop, but soybeans, small grains, corn, and hay are also grown. A few areas are pastured, but most pasture areas are small, and they usually are managed in the same way as adjoining tilled fields. These soils need nitrogen. Prompt removal of floodwaters is the chief management problem.

CLACK SERIES

The soils of the Clack series are strongly acid, very sandy, and excessively drained. They were derived from Mississippi River alluvium. They occupy low terraces along inactive channels of the Mississippi River in association with Bosket, Dundee, and Dubbs soils. They differ from associated soils in having been derived from lighter textured materials and in having little or no horizon differentiation. They resemble the Crevasse soils closely, but differ from them primarily in being strongly acid throughout instead of neutral to alkaline.

Clack loamy sand, level phase (0 to 2 percent slopes) (Ca).—This strongly acid soil is among the lightest textured, highest lying, and most droughty on the natural levees of the Mississippi River. It is composed of alluvial sediments grading from fine sandy loam to loamy sand or sand. It has slow to medium runoff and rapid to very rapid internal drainage.

Profile description:

- 0 to 8 inches, pale-brown loose loamy sand, low in organic matter; strongly acid.
- 8 to 18 inches, yellowish-brown friable to loose loamy sand; strongly acid.
- 18 to 40 inches +, light yellowish-brown or pale-brown nearly loose loamy sand; medium to strongly acid.

The texture of both surface soil and subsurface layer sometimes grades to a sandy loam or fine sandy loam.

This soil is low in organic matter and plant nutrients. It is very permeable and does not hold moisture well. Roots penetrate the soil easily, but plant nutrients and moisture are inadequate for maximum plant development. Plows are difficult to control in such loose sand.

Use and management.—Cotton, corn, oats, and soybeans are grown, but except in wet seasons yields are low because the soil is droughty. Pasture, hay, and winter cover crops can be grown if stands can be established. It is possible to grow early spring vegetables, provided they mature before the soil dries out.

Clack loamy sand, undulating phase (2 to 5 percent slopes) (Cb).—This phase is similar to the Clack loamy sand, level phase, except that it has more irregular relief, steeper slopes, and a slightly higher position. These factors make the soils more droughty than Clack loamy sand, level phase. Usually slopes range from 2 to 5 percent, but in a few areas they range to 10 or 15 percent. These stronger slopes are usually on old streambanks; they are included because they are too small to delineate as separate units.

Use and management.—Most of this soil, except the more sloping areas, has been cleared and is under cultivation. Cotton is the principal crop, but oats, hay, soybeans, corn, and a few vegetables are grown. The areas used for vegetables are usually farmed with

adjoining areas of other soils. Pasture, hay, and early spring crops can be grown if they are managed so that they will obtain maximum moisture from the soil.

Additional organic matter is needed to increase the moisture-holding capacity of the soil. If there is sufficient moisture in the fall to sprout the seed, winter cover crops should be grown. Nitrogen is needed. Soil samples should be sent to the Mississippi State College to be tested so that the need for fertilizers or supplements can be determined.

CLAY AND SAND BANKS

Along old streambanks in the county there are a few small areas of sand, clay, and sandy clay that have been mapped and correlated as Clay and sand banks. These areas have no consistent color, shape, size, or textural pattern.

Clay and sand banks, gently sloping (5 to 15 percent slopes) (Cc).—This mapping unit consists of gently sloping small areas of sand, clay, and sandy clay along old streambanks.

The colors vary with the type of parent material but usually range from dark gray to pale brown. The supply of organic matter is normally low, but in a few places it is high. The soil ranges from slightly to strongly acid. Surface runoff is rapid, and internal drainage is slow to rapid. In some places the soil consists of sand to depths of 6 to 8 feet; in others it is all clay; and in yet others the material is stratified and therefore variable in texture.

Use and management.—Since areas of this mapping unit are so small, they are usually managed in the same way as the surrounding soils. If feasible, crops on this soil should be planted on the contour. Soil-improving crops such as legumes should be grown more intensively than on the associated soils if it is practical to do so. More nitrogen may be needed than on surrounding soils, but samples of the soil should be tested in order to determine need for fertilizer. Some areas have never been cleared, and probably the sandier places should not be, as they are very droughty and erodible.

Clay and sand banks, sloping (15 percent or more slopes) (Cd).—This phase is very similar to the gently sloping phase. It differs, however, in having stronger and more irregular slopes and in being more droughty, especially in areas of greatest slope. It occurs along banks of old streams and varies in texture from sand to clay or has mixed textures where materials have been mixed. It ranges from slightly acid to strongly acid. As in the gently sloping phase, colors vary with the type of parent material. Both internal drainage and surface runoff are medium to very rapid.

Use and management.—Much of the land is grown up to brush and weeds because slopes are too steep for satisfactory tillage. If this soil is farmed, management is usually the same as for adjoining soils. Where it is feasible, crops should be planted on the contour so that erosion will be checked. Green-manure crops should be grown to add nitrogen to the soil. Many areas can be pastured advantageously.

CLAY SOILS (UNCLASSIFIED)

Clay soils (unclassified) (0 to 2 percent slopes) (Ce).—These soils are mapped on some of the low bottoms and first bottoms; their total acreage is large. They are usually uncleared, so it was not feasible to map the soils separately. The areas consist principally of Sharkey, Tunica, and Mhoon soils. Most of them are poorly drained, but drainage ranges from poor to somewhat poor. The cover consists of a fairly heavy stand of hardwoods, such as willow oak, red oak, post oak, hickory, elm, and maple. There is a dense undergrowth of brush, vines, and canes.

Use and management.—If these soils are cleared, their use and management is the same as for similar soils that are mapped separately. Cotton is the principal crop on planted areas. Some corn, soybeans, and sorghum are grown. Average crop yields are rather low because of poor drainage. Some areas are pastured, but pasture sods often drown out. Crops must be planted late in the season on tilled areas and must be harvested early.

COLLINS SERIES

The soil of the Collins series consists of moderately well drained, medium-acid alluvial silt loam washed from soils that were developed from acid loess. This soil occupies recent natural levees or first-bottom positions along the Mississippi River tributaries.

Collins silt loam (0 to 4 percent slopes) (Cf).—This soil is mapped on recent natural levees along the Coldwater River. It is moderately well drained and has medium surface runoff and internal drainage. It is flooded rather frequently during rainy seasons if it is not protected by dikes or ditches, but floodwaters usually do not stand for long periods.

Profile in a cleared area:

- 0 to 6 inches, light-brown or grayish-brown very friable silt loam with fine crumb structure; medium acid.
- 6 to 10 inches, pale-brown very friable silt loam with fine crumb structure; medium acid.
- 10 to 40 inches +, pale-brown very friable silt loam mottled with light gray, yellow, and brown; mottling grades from faint at the top of this layer to prominent and coarse in the lower part; slightly to medium acid.

Sand lenses are found in the subsurface of a few small areas that were included with this unit.

The silt loam texture distinguishes this soil from other low-bottom soils on which the silt deposits are thin or entirely absent.

Use and management.—Nearly all of this soil is farmed. Cotton, corn, soybeans, and hay are grown. Some areas are pastured, and some are in home gardens. The soil needs protection from floods. Cover crops such as vetch and burclover should be planted. Probably, complete fertilizers will be needed. However, samples of the soil should be sent to the Mississippi State College to be tested. It can then be determined what fertilizers or supplements are needed

COMMERCE SERIES

The Commerce series consists of moderately well drained alluvial soils derived from Mississippi River sediments. The soils occupy recent natural levees along the Mississippi River.

Commerce silt loam and very fine sandy loam (0 to 2 percent slopes) (Cg).—This mapping unit consists of two alluvial soils—a silt loam and very fine sandy loam—that are so intermingled that separation is difficult or impossible. They occur on the first bottoms or recent natural levees of the Mississippi River in the western and northwestern parts of the county. Although their total area is small, individual tracts are fairly large.

The soils are neutral to alkaline. They are moderately well drained but retain moisture well. Surface runoff is medium, and internal drainage is medium to slow. Originally, these soils were covered by forests consisting of red oak, willow oak, post oak, hickory, elm, maple, red gum, and some tupelo gum, and a dense undergrowth of brush, vines, and canes.

Profile description:

0 to 6 inches, pale-brown friable silt loam or very fine sandy loam; essentially structureless; neutral to alkaline.

6 to 30 inches, pale-brown friable silt loam, faintly splotted in the upper part with shades of yellow and brown; conspicuously mottled in the lower part with shades of gray and yellow; essentially structureless; neutral to alkaline.

30 to 42 inches +, pale-brown friable silty clay loam, conspicuously mottled with shades of gray; neutral to alkaline.

These soils usually are associated with Mhoon, Crevasse, and Robinsonville soils. They are lighter both in color and texture than the Mhoon soils and are finer textured and less undulating and droughty than the Crevasse soils. They resemble the Robinsonville soils in many respects, but have a very fine sandy loam or silty clay loam substratum within 40 inches of the surface. The heavier materials are at greater depths in the Robinsonville soils. The Robinsonville soils also have better internal drainage.

Use and management.—Nearly all areas that are protected by levees have been cleared and are under cultivation. Where the soils have been cultivated for a long time without organic matter being added, the upper layers have become lighter colored.

Cotton is the principal crop, but soybeans, corn, alfalfa, and small grains are grown. The soils are suitable also for hay, pasture, home vegetables, and fruits. Cotton and corn are usually followed by a winter cover crop of burclover. If summer legumes are planted as often as practical, the burclover cover crop should provide adequate organic matter. Erosion and drainage are not major problems, but nitrogen is needed.

Commerce silt loam, shallow phase (0 to 2 percent slopes) (Ch).—This phase occurs near the bank of the Mississippi River or along its former channel in association with Mhoon, Robinsonville, and Crevasse soils. It was derived from alluvial materials.

The soil is moderately well drained; surface runoff is medium, and internal drainage is medium to slow. The areas are relatively small and widely distributed. The original cover consisted of red oak,

willow oak, post oak, hickory, elm, maple, red gum, some tupelo gum, and a thick undergrowth of brush, vines, and canes.

Profile in a cleared area:

- 0 to 6 inches, pale-brown friable silt loam; weak fine granular structure; neutral to alkaline.
- 6 to 22 inches, pale-brown friable silt loam, slightly mottled in upper part with shades of yellow and brown and more strongly mottled in the lower part with shades of yellow and gray; weak fine granular structure; neutral to alkaline.
- 22 to 42 inches +, dark grayish-brown firm clay or silty clay loam, conspicuously mottled with shades of gray and pale yellow; neutral to alkaline.

This soil is better drained than the Mhoon soils but is not so well drained as the Robinsonville and Crevasse soils. It is less friable than Crevasse soils and more alkaline and coarser textured than the Bowdre soils, which are also found on recent natural levees. This phase is similar to Commerce silt loam and very fine sandy loam in its upper layers, but it is underlain by clay at a shallower depth, or at less than 30 inches.

Use and management.—Most of this soil has been cleared and for several years has been planted to crops continuously. Cotton is the principal crop. Soybeans, corn, small grains, hay, alfalfa, and other crops are grown. The soil is also suitable for home gardens, fruits, and pasture. It needs nitrogen and additional organic matter, although its supply of organic matter is already fairly large. Winter cover crops and, if practicable, summer legumes should be grown to increase nitrogen and improve tilth.

CREVASSE SERIES

This series consists of excessively drained alluvial soils derived from Mississippi River sediments. The soils occupy recent natural levees or first-bottom positions. They are neutral to alkaline throughout.

Crevasse sandy loam, level phase (0 to 2 percent slopes) (Ck).—This soil occurs on the tops of low ridges along the Mississippi River or in areas adjacent to old river channels. It has formed from sediments brought in by floodwaters of the Mississippi River. Although it occurs in small areas, the soil has fairly wide distribution. It is associated with the Commerce, Mhoon, Robinsonville, and Clack soils. It resembles the Clack soils except that it is neutral to alkaline. The Clack soils, in contrast, are strongly acid.

Drainage is excessive. The soil is usually droughty. Surface runoff is slow to rapid, and internal drainage is medium to rapid. The original cover of this soil consisted of willows and cottonwoods.

Profile description:

- 0 to 10 inches, pale-brown loose sandy loam; neutral to alkaline; organic-matter content usually low.
- 10 to 36 inches, pale-brown loose loamy sand; neutral to alkaline.
- 36 to 42 inches +, pale-brown loose loamy sand; neutral to alkaline; sometimes several feet thick.

Use and management.—Most areas protected by levees have been cleared and are farmed. Corn, hay, and truck crops are grown. To obtain satisfactory yields of corn and truck crops, it is necessary to

add large amounts of nitrogen and to plant crops early so that they will obtain maximum moisture. It would be well to have soil samples tested at the Mississippi State College in order to determine the need for other fertilizers or supplements. The soils need additional organic matter, which will help to retain moisture.

Crevasse sandy loam, undulating phase (2 to 5 percent slopes) (Cl).—The rather small, widely scattered areas of this soil occur on old natural levees or in some of the old channels along the Mississippi River. The parent material consists of sediments brought in by Mississippi River floodwaters. The soil occupies the more sloping areas adjacent to the level phase of Crevasse sandy loam. It is associated with Commerce, Mhoon, Robinsonville, and Clack soils. The soil is neutral to alkaline throughout. Usually, it is very droughty. Runoff is slow to rapid, and internal drainage is medium to rapid. Willows and cottonwoods were the original forest cover.

Profile description:

0 to 8 inches, pale-brown loose light sandy loam; neutral to alkaline; organic-matter content usually low.

8 to 30 inches, pale-brown loose loamy sand; neutral to alkaline; organic-matter content usually low.

30 to 42 inches +, grayish-brown to light-gray loose loamy sand; neutral to alkaline; sometimes several feet thick.

Use and management.—Most areas protected from floodwaters have been cleared and are now farmed. Corn and hay are grown, and some areas are in truck crops. Good management is necessary to obtain high yields. Crops must be planted early to obtain maximum moisture. Heavy applications of nitrogen are needed to make corn yield well, and additional organic matter is needed.

DOWLING SERIES

Soils of the Dowling series are slightly acid and poorly drained. As they occupy low swags or depressions, they are frequently covered by water. They are derived from Mississippi River alluvium.

Dowling soils (0 to 2 percent slopes) (Db).—This unit consists of small areas of very fine sandy loam, silt loam, and clay loam so combined that they cannot be separated easily. Some of the alluvium from which they were formed was deposited by slack waters from the Mississippi River, and some was washed or sloughed from local soils such as the Bosket, Dubbs, and Dundee. The soils occur in depressions that are closely associated with swamps and drains or are frequently in old drains. They occupy positions similar to those occupied by Souva and Ark soils. Nevertheless, their parent materials appear to have been in place longer than those of the Souva and Ark soils. The Dowling soils of this mapping unit are finer textured and are not so well drained as the Ark soils.

Drainage is poor in these soils. Surface runoff is very slow to ponded. Water moves very slowly through the soil and during flood seasons stands on some areas for long periods. Most of these soils are covered by forests of cypress and tupelo gum or by a growth of buttonbush, sedges, swampgrasses, briers, and vines.

Profile description:

0 to 5 inches, dark grayish-brown friable to very firm clay to very fine sandy loam; plastic when wet and hard when dry; moderate medium to fine granular structure; slightly acid.

5 to 24 inches, light-gray friable to very firm clay to very fine sandy loam that shows faint mottlings of yellowish brown; plastic when wet and very hard when dry; weak coarse blocky structure; medium acid to neutral.

24 to 40 inches +, grayish-brown very firm clay faintly mottled with yellowish brown; massive; plastic when wet and very hard when dry; medium acid to neutral; usually several feet thick.

Use and management.—Much of this mapping unit is still in forest. Some areas have been cleared and are planted to cotton, corn, and soybeans. Some small tracts are in hay or are pastured, but flooding makes pasture sod difficult to maintain. It is hard to obtain adequate drainage for these areas, to maintain drainage ditches, and to manage crops so that they can be matured in the short season after floodwaters have receded in the spring. The soils need additional organic matter and nitrogen. The amounts needed can be determined by sending soil samples to the Mississippi State College for testing.

Dowling silt loam and clay loam (0 to 2 percent slopes) (Da).—This unit consists of two soil types that cannot be separated easily because they occur in such small areas and are so intricately combined. Textures vary from place to place, but not so widely as in the unit mapped as Dowling soils. Usually the surface texture is silt loam or clay loam. Areas of a given texture are small but distinct.

These soils occur in depressions; they are intricately associated with the unit mapped as Dowling soils and with swamps and drains. Often they occur in old drains. Like the unit mapped as Dowling soils, they occupy positions similar to those of the Souva and Ark soils. Their parent materials, however, have apparently been in place longer than those of the Souva and Ark soils. They are finer textured than the Ark soils.

Part of the materials from which these soils were derived was deposited by slack waters from the Mississippi River; some was washed or sloughed from local Bosket, Dubbs, and Dundee soils.

Surface runoff is very slow to ponded, and internal drainage is very slow. Water stands for fairly long periods after floods. Most of these areas are still in cypress and tupelo-gum forest and have a cover of buttonbush, sedges, swamp grasses, briers, and vines.

Use and management.—A fairly heavy growth of timber covers most of this mapping unit, but some areas have been cleared and are planted to cotton, corn, soybeans, and hay. Some of this soil is pastured, but pasture sods are often drowned out. Crop yields are fairly good except in wet seasons; then crops are sometimes a complete failure. It is difficult to find drainage outlets for these low areas. After ditches are established, it is hard to keep them clear of weeds, grass, and tree roots. Cultivation is made more difficult because the floods recede and the ground dries out so late in spring that farmwork has to be rushed. Nitrogen and additional organic matter are needed.

DUBBS SERIES

The Dubbs soils were derived from Mississippi River sediments. They occupy the higher positions on the old levees and belong to the group of soils on low terraces. They are moderately well to well drained and medium to slightly acid and show a significant amount of profile development.

Dubbs silt loam and very fine sandy loam, level phases (0 to 2 percent slopes) (Dc).—In this unit the silt loam and very fine sandy loam were mapped together because they could not be separated easily. These are light brownish-gray soils of the low terraces. The somewhat small, rather widely scattered areas are on the higher natural levees along the Mississippi River or along its old runs. The parent material is stratified beds of both light-textured and heavy-textured Mississippi River sediments.

These soils are well drained, but moisture-holding capacity is good throughout the profile. Surface runoff and internal drainage are medium. Plant roots penetrate easily to all parts of the profile. Organic matter is fairly high in the surface layer at the time the soils are first cleared. It disappears rapidly as the soils are cultivated, unless it is replaced by plowing under cover crops or by other means.

Soils of this mapping unit have significantly more profile development than the associated Clack, Bosket, Dundee, and Forestdale soils. They are not so excessively drained as the Clack and Bosket soils but are better drained than Dundee and Forestdale soils. Their layers are more distinctly developed than those of the Clack and Bosket soils.

The original cover consisted of hardwoods such as red oak, chestnut oak, post oak, swamp chestnut oak, willow oak, live oak, tupelo gum, red gum, hickory, and maple, and a heavy undergrowth of brush, canes, briars, and vines.

Profile description:

0 to 6 inches, light brownish-gray, very friable, fine granular silt loam or very fine sandy loam; slightly acid.

6 to 24 inches, pale-brown to yellowish-brown friable silty clay loam to sandy clay loam; moderately plastic when wet; well-developed coarse blocky structure; medium to slightly acid.

24 to 36 inches +, pale-brown or light yellowish-brown friable silt loam or very fine sandy loam, slightly mottled with shades of yellow and gray; medium to slightly acid.

Use and management.—Nearly all of this mapping unit has been cleared and farmed for a number of years. The principal crops are cotton, corn, soybeans, small grains, and hay. Yields are fairly high. Some areas are pastured, and some are used to grow vegetables and fruits for home use.

The soils are easily managed and can be tilled over a fairly wide range of moisture content. Summer legumes and winter cover crops such as burclover, crimson clover, and vetch should be grown to increase the supply of nitrogen in the soil, as nitrogen is apparently the principal fertilizer needed. Although erosion is not serious, crops on some of the more sloping areas should be planted in rows running across the slope.

Dubbs silt loam and very fine sandy loam, undulating phases (2 to 5 percent slopes) (Dd).—The dominant soils of this unit are Dubbs silt loam and Dubbs very fine sandy loam, but occasional sandblows occur in sandier spots when the river is at flood stage. The silt loam and very fine sandy loam soils are so combined and the individual areas are so small that the two were mapped together.

This unit is adjacent to the level phases of Dubbs silt loam and very fine sandy loam. It is associated with Clack, Bosket, Dundee, and Forestdale soils. The undulating phases are similar to the level phases but occupy stronger slopes and have a more variable relief.

Use and management.—Nearly all of this soil has been cleared and is farmed. The principal crop is cotton, but soybeans, corn, small grains, and hay are grown. Some of the land is pastured or is in small truck gardens or orchards that supply vegetables and fruits for home use. Tillage is rather easy and is possible under a wide range of moisture content. In order to check sheet erosion, crops should be planted in rows running across the slopes.

The soils need additional organic matter. The principal fertilizer needed is nitrogen. This can be supplied by growing winter cover crops such as burclover, vetch, crimson clover, and small grains, and by growing summer legumes if it is feasible to turn them under.

Dubbs very fine sandy loam, level phase (0 to 2 percent slopes) (De).—This mapping unit is similar to the Dubbs silt loam and very fine sandy loam, level phase, but has a more uniform very fine sandy loam surface layer. It occurs on low terraces that have been built up by floodwaters of the Mississippi River. It sometimes occurs along the present bank of the Mississippi River or it may be near banks of old runs.

The soils are associated with the Clack, Bosket, Dundee, and Forestdale soils. They are not so sandy nor so droughty as the Clack soils. They resemble the Bosket soils, but their surface layer is somewhat finer than that of the Bosket soils, and they are not quite so well drained. Their surface layer is finer than that of the Dundee or Forestdale soils, and they are better drained.

Use and management.—The soils of this mapping unit are among the most desirable in the county. Cotton is the principal crop. Soybeans, corn, small grains, and hay are also grown. Some areas are pastured or are used to grow fruits and vegetables for home use. Alfalfa can be grown, but the soil is medium acid to slightly acid and lime must be added to obtain good yields.

Erosion is not severe, but on sloping areas, crops should be planted in rows that run across the slope. Usually nitrogen is the only fertilizer needed, but the soils need more organic matter. Crop rotation is important.

Dubbs very fine sandy loam, undulating phase (2 to 5 percent slopes) (Df).—This unit generally consists of very fine sandy loam but it includes a few patches of silt loam. It is closely associated with the other Dubbs soils. Except for its more uniform surface texture, it is very similar to the Dubbs silt loam and very fine sandy loam, undulating phase. It is similar to Dubbs very fine sandy loam, level phase, but has stronger slopes and more variable relief and is a little more droughty.

This soil is more subject to sheet erosion than the level phase of Dubbs very fine sandy loam. As a result its surface layer is a little thinner and contains somewhat less organic matter.

Use and management.—This soil is principally in cotton, but some of it is planted to soybeans, annual hay, and small grains. Some areas are pastured or are used to grow truck crops and fruit for home use. Where alfalfa is grown, lime is needed to get satisfactory yields. Since the soil needs nitrogen and organic matter, winter cover crops should be planted and the crops should be rotated. Crops should be planted in rows running across the slope on most areas. This practice will help control erosion. Tillage is easy and is possible under a wide range of moisture content.

DUNDEE SERIES

The Dundee series consists of somewhat poorly to moderately well drained, strongly acid soils. They were derived from medium-textured to light-textured sediments brought in by the Mississippi River. The soils occur in intermediate positions on the old natural levees and they fall in the group of soils on low terraces. They show a significant profile development.

Dundee silt loam, level phase (0 to 2 percent slopes) (Dk).—This moderately well drained soil was derived from materials deposited by Mississippi River floodwaters. Areas of this soil are small but are widely scattered over the western third of the county on low terrace positions or natural levees on the banks of the Mississippi River or along its former runs.

This soil is associated with Clack, Bosket, Dubbs, and Forestdale soils. It is not so well drained as the Clack, Bosket, and Dubbs soils. The surface texture is finer than that of the Clack and Bosket soils and is usually finer than that of the Dubbs.

The original forest cover consisted of a fairly heavy growth of red oak, Spanish oak, live oak, red gum, tupelo gum, hickory, maple, and hornbeam. Canes, briers, and vines formed a dense undergrowth.

Profile in a cultivated field:

- 0 to 8 inches, grayish-brown friable fine granular silt loam; moderately low organic-matter content; strongly acid.
- 8 to 26 inches, light grayish-brown or yellowish-brown friable medium blocky silty clay loam, faintly mottled with fine splotches of yellow and gray; strongly acid.
- 26 to 36 inches+, pale-brown friable silty clay loam mottled with gray and yellow; strongly acid.

Use and management.—Cotton is the principal crop, but soybean acreage has increased recently. Corn, small grains, and hay are grown to some extent. Part of the land is pastured. Provision for drainage is important because this soil is sometimes flooded. Nitrogen should be added by growing winter cover crops and by rotating summer legumes with other crops. Soil samples should be sent to the Mississippi State College to be tested so that the need for other fertilizers and supplements will be known.

Dundee silt loam, undulating phase (2 to 5 percent slopes) (Dl).—This phase occupies stronger slopes than the level phase of Dundee silt loam, has more variable relief, and is usually a little better drained. It has a slightly thinner surface layer. This soil is closely

associated with the level phase and other Dundee soils and with Clack, Bosket, Dubbs, and Forestdale soils. The original forest cover was the same as that on the level phase of Dundee silt loam.

Use and management.—Nearly all of Dundee silt loam, undulating phase, has been cleared and is planted to crops. Most of it is planted to cotton each year, but the soybean acreage is increasing. Soybeans, corn, hay, and pasture are sometimes rotated with cotton.

It is difficult to find drainage outlets for floodwaters. Floods often drown out pastures and make it difficult to grow winter cover crops. If they can be grown, cover crops such as burclover should be planted to add nitrogen to the soil. Soil samples should be sent to the Mississippi State College for testing. This will indicate the need for fertilizers or other supplements.

Dundee silt loam and very fine sandy loam, level phases (0 to 2 percent slopes) (Dg).—These two soil types were mapped together because they occur in such small areas and are so intricately combined that they could not be separated easily. This unit is similar to both Dundee silt loam, level phase, and Dundee very fine sandy loam, level phase. The surface texture is a little coarser and less uniform than that of Dundee silt loam, level phase. The many small patches of silt loam in the surface soil make this soil different from Dundee very fine sandy loam, level phase. The original timber cover was the same as that on Dundee silt loam, level phase.

Use and management.—Nearly all of this unit has been cleared and is planted to cotton, soybeans, corn, and hay. Some areas are pastured, but the pasture sods are often drowned out by floods. It is difficult to find drainage outlets to remove floodwaters quickly. Additional nitrogen and organic matter are needed, but the floods make it difficult to grow winter cover crops. Summer legumes should be rotated with other crops to improve tilth and to add nitrogen. Soil samples should be sent to the Mississippi State College to be tested so that the need for fertilizers and other supplements can be determined.

Dundee silt loam and very fine sandy loam, undulating phases (2 to 5 percent slopes) (Dh).—This unit is similar to Dundee silt loam and very fine sandy loam, level phases, and to Dundee silt loam, level phase. Nevertheless, it has stronger slopes, more variable relief, slightly better drainage, and a somewhat thinner surface layer. In many small areas its surface layer is coarser textured than the surface layer of Dundee silt loam, level phase.

Use and management.—Cotton is the principal crop, but some soybeans are planted. Corn and hay are not grown extensively, and only small areas are pastured. Rapid removal of floodwaters is difficult because of the lack of drainage outlets. Organic matter is badly needed, but the maintenance of pastures or the growing of cover crops is hindered by floods. Soil samples should be sent to the Mississippi State College for testing to determine what fertilizers and other supplements are needed.

Dundee very fine sandy loam, level phase (0 to 2 percent slopes) (Do).—This very desirable soil is one of the most extensive of the group on low terraces. It occurs mainly in the central and western

parts of the county, but in some places in the eastern part. As a rule it lies adjacent to soils of the low bottoms. It is associated with Clack, Bosket, and Dubbs soils. It is the most poorly drained of these soils, and its subsoil is the most mottled. The original cover consisted of hardwoods, brush, canes, briers, and vines.

Surface runoff is moderate, and movement of water through the soil is moderately slow. The soil is strongly acid throughout. The organic-matter content is low. Roots may penetrate into the sub-surface layer fairly easily, but not so easily as in the Dubbs and Bosket soils.

The surface soil, or plow layer, is a grayish-brown friable very fine sandy loam, 6 to 10 inches thick. The subsurface layer, extending to depths of 20 to 60 inches, usually is light brownish-gray to yellowish-brown moderately friable silty clay loam, mottled with gray and yellow. The substratum is pale-brown fine sandy clay loam or fine sandy loam mottled with gray and yellow. In places, however, it is clay or silty clay, overlain by a subsurface layer of pale-brown friable fine sandy loam mottled with gray and yellow.

Use and management.—The luxuriant original cover has been cleared and most of the soil is now cultivated. It is highly productive and well suited to crops common to the area. Cotton, the principal crop, is usually followed by burclover, which is turned under. The soybean acreage is increasing; corn is fairly common, and some oats are grown. To maintain high yields, apply nitrogen fertilizer and rotate soil-improving crops with other crops. The texture and tilth of the soil make farm operations possible at any season, but the suitability for tillage is somewhat more limited than for the Dubbs and Bosket soils.

Dundee silty clay loam, level phase (0 to 2 percent slopes) (Dm).—This soil is associated with Clack, Dubbs, and Forestdale soils and with other soils of its own series. It resembles Dundee very fine sandy loam, level phase, except that it has a finer texture and somewhat thinner surface layer. The original cover consisted of a heavy growth of hardwoods, brush, vines, briers, and canes.

The surface soil, or plow layer, is grayish-brown friable to firm silty clay loam, 4 to 6 inches thick. The subsoil, extending to depths of 24 to 60 inches, is light brownish-gray or yellowish-brown firm clay or silty clay mottled with yellow and gray. The substratum is pale-brown firm silty clay loam to friable sandy loam mottled with gray and yellow.

Use and management.—Most of this soil has been cleared and is now cultivated. It is fairly productive but somewhat more difficult to till than the coarser textured soils. It cannot be worked so soon after rains.

Cotton is the principal crop. Corn, soybeans, oats, and annual hay are also grown. Occasionally, flooding causes crop failure. Rapid removal of floodwaters is hindered because drainage outlets are difficult to find.

Dundee silty clay loam, undulating phase (2 to 5 percent slopes) (Dn).—This soil occurs in the same positions and is associated with the same soils as Dundee silty clay loam, level phase. It is somewhat more difficult to till and is less productive than the lighter

textured Dundee soils. It is strongly acid and has a fairly low supply of organic matter. Plant roots do not penetrate the surface layer readily. This soil is very similar to the associated Forestdale soils in characteristics and position. The original cover consisted of hardwoods, brush, canes, briars, and vines.

The surface layer is 4 to 6 inches of grayish-brown silty clay loam, somewhat sticky and plastic when wet and hard when dry. The subsurface layer is light-brown clay or silty clay mottled with gray and yellow. The substratum is a pale-brown sandy clay or friable sandy loam with gray and yellow mottlings.

Use and management.—Most of this soil has been cleared and is farmed. Cotton is the usual crop, but soybean acreage is increasing. Some corn and oats are grown. Crop adaptations and soil-management practices are similar to those for Forestdale soils. The periods when farming can be carried on are much more limited than on the silty and sandy phases of the Dundee soils. Quick removal of floodwaters is very important, and additional organic matter is needed.

FORESTDALE SERIES

The Forestdale series consists of poorly to somewhat poorly drained alluvial soils derived from medium-textured to heavy-textured Mississippi River sediments. These soils occupy the lowest positions on the old natural levees. They border former channels of the river and belong to the group of soils on low terraces. They are strongly acid throughout and have slight profile development. Forestdale silty clay loam and clay is the dominant mapping unit in this series.

Forestdale silt loam, level phase (0 to 2 percent slopes) (Fa).—This strongly acid alluvial soil was derived from medium-textured to heavy-textured sediments brought in by the Mississippi River. It occupies the lowest positions on the old natural levees along former channels of the river. This soil is somewhat poorly drained; surface runoff is medium to slow, and movement of water through the soil is slow. The subsurface layer is so wet and heavy textured that plant roots do not penetrate it readily.

This soil is associated with Clack, Bosket, Dubbs, Dundee, Sharkey, and Tunica soils and with other phases of the Forestdale series. Its surface layer is lighter colored than that of the Sharkey and Tunica soils. Its subsurface layer, lighter colored than that of the Dundee soils, is a silty clay loam. In contrast, the subsurface layer of the Dundee soils is light-brown or grayish-brown silty clay loam, silty clay, or clay. The original cover consisted of a rather dense growth of hardwoods, underbrush, vines, and briars.

Profile in a cleared area:

- 0 to 6 inches, light brownish-gray friable fine granular silt loam; moderate organic-matter content; strongly acid.
- 6 to 24 inches, light brownish-gray firm weak medium blocky silty clay loam mottled with brown and yellow; strongly plastic when wet and hard when dry; strongly acid.
- 24 to 36 inches +, light-gray to brownish-gray firm to friable silty clay loam or fine sandy clay loam mottled with brown and yellow; strongly acid.

Many areas of this soil are underlain by a substratum of coarser textured material. Where this coarser material is absent, the soil

resembles the Alligator soils, which are a light-gray clay to a depth of about 40 inches.

Use and management.—Nearly all of this soil is farmed. Cotton is by far the most common crop, but soybeans, corn, and oats are grown, and some areas are pastured. If the soil is well managed, yields of cotton are fairly good except in wet seasons. Drainage is usually necessary. Nitrogen is needed to supplement the plant nutrients in the soil, and crops should be grown that will improve tilth and fertility.

Forestdale silt loam, undulating phase (2 to 5 percent slopes) (Fb).—This soil is closely associated with other phases of the Forestdale series on the old natural levees. It is poorly drained but adjoins better drained soils such as the Clack, Bosket, Dubbs, and Dundee. Sometimes it is bordered by soils of the first bottoms, such as the Alligator, Tunica, and Sharkey. This phase resembles the level phase of Forestdale silt loam, but it is on somewhat more irregular topography and is a little better drained on the higher ridges. The original cover was hardwoods.

The surface layer is brownish-gray to light grayish-brown or pale-brown friable silt loam, 4 to 6 inches thick. This layer may be darker if the soil has been cleared recently or if large amounts of organic matter have been added. The subsurface layer, extending to depths of 24 to 40 inches, is light brownish-gray friable to firm silty clay, distinctly mottled with yellow and brown. The substratum is a light-gray to brownish-gray silty clay to silty clay loam or fine sandy clay loam that shows mottlings of brown and yellow.

Use and management.—Most areas have been cleared and are cultivated. Cotton is the usual crop, but soybeans, corn, and oats are grown to some extent. Cotton and soybeans usually produce fairly high yields, but the yields of corn and oats are rather low.

Drainage is needed to remove floodwaters quickly. It would be well to plant soil-building crops frequently and to use suitable fertilizers. Samples of the soil should be sent to the Mississippi State College for testing in order to determine just what fertilizers and supplements are needed. In the sloping areas, crops should be planted in rows running across the slopes to help prevent erosion. The soil should not be tilled when it is wet.

Forestdale silty clay loam-clay, level phases (0 to 2 percent slopes) (Fc).—The strongly acid poorly drained soils of this unit occur on level to nearly level slopes, most of which have gradients of less than 1 percent. Surface runoff is moderately slow and internal drainage slow. Plant roots have some difficulty in penetrating below the surface layer because the subsurface layer is so wet and heavy textured.

Areas are rather widely distributed. They lie between the typical soils of the low bottoms, such as the Sharkey, and the soils of the low terraces, such as the Dubbs and Dundee. They are most closely associated with the Sharkey, Tunica, and Dundee soils.

The 4- to 6-inch surface layer is light brownish-gray silty clay loam or clay of fine granular structure that is darker colored in recently cleared or forested areas. It is sticky and plastic when wet. If worked when wet, it will pack and clod when it dries out.

The subsurface layer is light brownish-gray clay prominently mottled with yellow and brown. It is sticky and plastic when wet and very hard when dry. The substratum is a light-gray to brownish-gray moderately friable silty clay loam or fine sandy clay loam with some brown and yellow mottling.

The surface layer is lighter colored than that of the Sharkey and Tunica soils. The subsurface layer is lighter colored than that of the Dundee soils. This unit, like some other Forestdale soils, sometimes has an underlying substratum of coarser textured material. Where there is no such substratum, this soil resembles the Alligator soils, which are grayish-brown to light-gray clay to a depth of approximately 40 inches.

Use and management.—Approximately 80 percent of the land has been cleared and is being farmed. Cotton is the principal crop, but yields are only fair. Oats and soybeans yield well and are increasing in importance. Only a small amount of corn is grown, and corn yields are comparatively lower than cotton yields.

It is necessary to provide drainage for some areas. Organic matter is fairly high, but soil-improving crops should be planted to maintain tilth and to add nitrogen. Soil samples should be sent to the Mississippi State College for testing in order to determine deficiencies in fertilizer and supplements.

Forestdale silty clay loam-clay, undulating phases (2 to 5 percent slopes) (Fd).—This unit is very similar to the level phases but has stronger and more variable slopes. It requires drainage only to remove floodwaters. Surface runoff is more rapid than on the level phases.

The surface layer is a light brownish-gray friable to very friable silty clay loam or clay, 4 to 6 inches thick, sticky and plastic when wet. This layer is darker in areas still in forest or recently cleared or in those that have received large amounts of organic matter.

The subsurface layer, a light brownish-gray clay prominently mottled with yellow and brown, extends to depths of 24 to 40 inches. It is sticky and plastic when wet and hard when dry. The substratum is a light-gray to brownish-gray moderately friable silty clay loam or fine sandy clay loam with some brown and yellow mottling.

Use and management.—Approximately 80 to 90 percent of the land is in crops. Most of it is planted to cotton, but yields are only fair. The soybean acreage is increasing. Some corn is planted, but yields are low. Oats do fairly well but in lower areas are sometimes drowned out.

Although much of the soil has sufficient drainage, floodwaters should be removed quickly from flooded areas. Cover crops should be grown to add nitrogen to the soil and to improve tilth.

MHOON SERIES

The Mhoon series consists of somewhat poorly drained neutral to alkaline alluvial soils that were derived from sediments deposited by the Mississippi River. They occupy the lowest positions on first bottoms of the recent natural levees. Mhoon silt loam is the dominant type in the series.

Mhoon silt loam (0 to 4 percent slopes) (Mb).—This soil of the first bottoms was derived from Mississippi River sediments. It occurs in small widely scattered areas and is associated with the Commerce, Robinsonville, and Crevasse soils. Of the soils on first bottoms, it is the most poorly drained, the darkest colored, and finest textured in the subsoil layers.

Usually Mhoon silt loam occurs on low slopes of less than 2 percent. It is somewhat poorly drained. Both surface runoff and internal drainage are medium to slow. The original cover consisted of a heavy growth of hardwoods and an undergrowth of brush, vines, and canes.

Profile in a cleared field:

- 0 to 8 inches, pale-brown very friable weak granular silt loam containing a moderate amount of organic matter; neutral to alkaline.
- 8 to 14 inches, pale-brown to light-gray friable structureless silt loam distinctly mottled with shades of yellow, brown, and gray; neutral to alkaline.
- 14 to 24 inches, dark grayish-brown friable structureless silt loam mottled with shades of gray and brown; neutral to alkaline.
- 24 to 36 inches +, yellow and brown firm massive silty clay loam; neutral to alkaline; usually several feet thick.

Use and management.—Cotton, soybeans, and corn are grown, and some of the soil is in pasture. Most crops produce fairly high yields if the soil is well managed. To obtain high yields, however, it is necessary to provide for drainage so that floodwaters can be removed quickly. Additional organic matter is needed. Soil-building crops should be rotated with other crops to add nitrogen to the soil, and they may improve tilth. Soil samples should be sent to the Mississippi State College to be tested to determine the need for fertilizers and supplements.

Mhoon and Sharkey soils (0 to 4 percent slopes) (Ma).—This unit consists of mixed Sharkey and Mhoon soils. The profiles, though variable, generally resemble those of Mhoon silt loam and Sharkey clay. In some areas the entire profile is uniformly that of a Mhoon soil, and in others, that of a Sharkey soil. These areas of uniform profile are too small to map separately. The mapping unit covers a small acreage; it is associated with other Mhoon and Sharkey soils, and with Bowdre and Forestdale soils.

This unit is mostly nearly level, but a few slopes reach 4 percent. Slow runoff of floodwaters causes somewhat poor to poor drainage.

Use and management.—Where these soils are cleared, they are usually planted to cotton. Soybeans, corn, and oats are also grown. Some of the areas are pastured, and there are some small fields planted to annual hay and minor crops. The soils need additional organic matter to improve tilth and to help retain plant nutrients. Drainage should be provided so that floodwaters will not drown out the crops.

RIVERWASH

Riverwash (Ra).—This unit consists of islands in the Mississippi River or of areas of very low elevation on the bank of the river. The soil usually consists of a surface layer of loamy sand, which may be several feet thick. In some areas the loamy sand is covered by several inches of clay.

The river is constantly adding to the sandbars or cutting them away, so boundary lines are not permanent. A single flood may establish a new area of this soil or may wipe out an old area. The soil is frequently covered by floodwaters. It is worthless for agriculture. Most of it is bare, but some is covered by a growth of small willows, cottonwoods, and weeds.

ROBINSONVILLE SERIES

The Robinsonville series consists of well-drained alluvial soils derived from sediments deposited by the Mississippi River. These soils occupy recent natural levees or first bottoms along the Mississippi River. They are neutral to alkaline throughout.

Robinsonville silt loam and very fine sandy loam (0 to 4 percent slopes) (Rb).—In this unit Robinsonville silt loam and very fine sandy loam were mapped together because they occur in areas too small and irregular to map or farm separately. They are neutral to alkaline alluvial soils occupying positions on the first bottoms bordering the Mississippi River in the western part of the county. Their original cover was a heavy growth of hardwood trees, underbrush, vines, canes, and briars.

Erosion is not a serious problem. Surface runoff is slow because the soils are somewhat open and have mild slopes. Movement of water through the soils is medium to rapid, so they are well drained. Although well drained, they store water well.

Soils of this unit are associated with Crevasse, Commerce, and Mhoon soils. They are better drained than the Commerce and Mhoon soils. They are not so coarse textured and droughty as the Crevasse soils, but in places their surface layer is a loose loamy sand that approaches the texture of Crevasse soils. In such areas circular sandblows may occur.

Profile in a cleared field:

- 0 to 10 inches, pale-brown very friable structureless silt loam; neutral to alkaline.
- 10 to 36 inches, yellowish-brown very friable fine granular silt loam or very fine sandy loam, somewhat compacted in places; sometimes faintly mottled with shades of gray and brown at depths below 18 inches; neutral to alkaline.
- 36 to 42 inches +, light yellowish-brown or yellowish-brown very friable loamy fine sand to silty clay loam or clay.

Use and management.—These soils are some of the most productive in the county, and they respond well to good management. They are easily tilled over a fairly wide range of moisture content. Cotton is usually grown every year, and yields are generally good. Corn, sorghum, soybeans, small grains, and hay are grown to some extent, and some areas are planted to fruit or truck crops for home use.

The supply of organic matter is low; additional organic matter would improve tilth, add plant nutrients, and help to increase the capacity to store moisture. The nitrogen content should be built up by planting winter legumes, such as burclover and vetch, or small grains. Suitable fertilizers should be used to supplement the plant nutrients already in the soils. However, soil samples should first be sent to the Mississippi State College for testing so that the need for fertilizers and supplements can be determined. Other crops should be rotated with

soil-depleting crops in order to keep the soils in good condition and to derive the maximum value from them.

SAND BANKS, SLOPING

Sand banks, sloping (5 to 20 percent slopes) (Sa).—This land type occupies the sloping banks of bayous or former river channels. It is on short gentle to steep slopes and consists of sand banks protected by a levee. It lies between soils of the low terraces or first bottoms and soils of the depressional and colluvial lands. All of this land type occurs in long narrow strips.

This land type is not uniform, but its surface layer is usually a pale-brown to brownish-gray loose loam several feet thick. Occasionally, the exposed ends of underlying clay strata are visible at the surface. The area having exposed clay is only a small part of the total area mapped. Both surface runoff and internal drainage are rapid to very rapid. The reaction varies widely, and the supply of organic matter is very low.

Use and management.—Most of this land has been cleared and is being farmed. Cotton, corn, burclover, and legumes are usually grown, or the land is pastured. Yields are fairly good. To prevent erosion, the steeper slopes should be pastured or used to grow hay or timber.

SHARKEY SERIES

The Sharkey series consists of poorly drained alluvial soils derived from dark-colored, heavy-textured sediments brought in by the Mississippi River. They are soils of the low bottoms that usually occupy low broad flats or slack-water areas on the flood plain. They are commonly called buckshot soils. Sharkey clay is by far the most extensive of the soils in this series.

Sharkey clay, undulating phase (2 to 5 percent slopes) (Sd).—This soil is derived from heavy-textured Mississippi River alluvium. Because of peculiarities in its texture, it is commonly called buckshot soil. It occupies first bottoms—low, broad flats or slack-water areas on the flood plain.

The areas of this soil are rather large and are closely associated with areas of Alligator and Tunica soils. The soil was derived from thinner beds of fine-textured sediments than the Alligator soils and from thicker beds than the Tunica soils. It is darker than and not so gray as the Alligator soils. It is not so brown as the Tunica soils and is more poorly drained.

Although this soil is poorly drained, it has slightly better drainage than some Sharkey soils. Like others of its series, it is subject to flooding if not protected by levees. The water, however, moves off fairly rapidly. Heavy cracks appear in the surface layer if the soil dries down as far as the substratum.

The original cover consisted of a fairly heavy growth of elm, water oaks, hackberry, sweetgum, ash, pecan, and water hickory, and an undercover of brush, vines, briars, and canes.

Profile in a cleared area:

0 to 4 inches, very dark gray moderate medium to fine granular very firm plastic clay; moderately high organic-matter content; slightly acid to alkaline.

4 to 20 inches, gray to dark-gray moderately coarse blocky very firm plastic clay faintly to prominently mottled with yellowish brown; low organic-matter content; slightly acid to alkaline.

20 to 42 inches +, dark-gray medium coarse blocky firm plastic clay mottled with yellowish brown; medium acid to alkaline.

Use and management.—Cotton is the principal crop, but oats, soybeans, and alfalfa are also grown. These crops do fairly well if drainage is provided and if the season is not too wet. The soil is not well suited to corn unless special fertilizers are used.

This soil is difficult to manage. It needs drainage and can be cultivated within only a limited range of moisture content. It is in good condition for cultivation for only very brief periods between rains. Organic matter is needed.

Sharkey silty clay loam, level overwash phase (0 to 2 percent slopes) (Sf).—Originally, this appears to have been a Sharkey clay soil. At present, however, the surface layer is covered by a thin deposit of silty clay loam that has been brought down from adjoining higher areas by erosion. This soil has slightly better drainage than most of the Sharkey clay soils, but some areas may be flooded for brief periods.

Most areas of this soil are small. They occur as long, narrow strips that border Sharkey clay and lie adjacent to higher areas from which silty clay material has been washed. The total area is small.

Except for the thin deposit of silty clay loam on its surface, the profile of this soil is essentially the same as that of Sharkey clay, undulating phase. It is slightly acid to alkaline throughout.

Use and management.—Cotton, soybeans, oats, and some corn are grown. Although clover is planted occasionally, floods and winter freezing make winter cover crops difficult to grow. Crop yields are moderately high if the fields have not been flooded.

More organic matter is needed. The soil should be tilled only after it has dried out after floods or rains. Drainage should be provided on areas large enough to make it practical.

Sharkey silty clay loam, undulating overwash phase (2 to 5 percent slopes) (Sg).—Except for a thin surface layer of silty clay loam, and perhaps slightly better drainage, this soil is almost identical to Sharkey clay, undulating phase. It occurs in long narrow strips near the base of slopes where material has been washed from adjoining soils. Its total acreage is not large. The surface layer, which has a fairly large supply of organic matter, consists of several inches of silty clay loam that has been washed from soils that occupy nearby higher areas.

Use and management.—The principal crop is cotton, but oats, soybeans, and corn are grown. Cover crops such as burclover are not grown extensively because of winterkilling and floods. Additional organic matter and nitrogen are needed, and tilth needs to be improved.

This soil must be protected by levees if it is to be farmed successfully. If areas are large enough to make it practical, drainage should be installed. Soil samples should be sent to the Mississippi State College for testing to determine the need for fertilizers and supplements.

Sharkey-Alligator clays, level phases (0 to 2 percent slopes) (Sb).—This is the most extensive soil unit mapped in Tunica County. It occurs on large level or nearly level areas in the central part of the county or in smaller areas scattered through much of the county.

The unit consists of what are commonly called buckshot soils. They occupy slackwater and backwater areas in association with Tunica, Alligator, and Forestdale soils. Their surface layer is darker colored than that of the Forestdale soils, and they do not have the coarser textured substratum common to Forestdale and Tunica soils.

These soils are slightly acid to neutral throughout. Surface drainage is very slow and internal drainage slow. The supply of organic matter is fairly large. The roots of only a few annual plants penetrate below the surface layer, although the roots of trees and other perennials penetrate deeper. Trees and perennials are not so numerous on these soils as they are on more open and better drained soils.

The surface layer is 4 to 6 inches of very dark gray or grayish-brown clay, plastic and sticky when wet and hard when dry. If the soils are plowed at the right moisture content, the furrow slice breaks into a mass of small aggregates or buckshot. If plowed too wet, the soils tend to puddle and do not work down readily. Disk-plowing works very well if the soils are dry enough.

The subsurface layer—a gray clay mottled with brown and yellow—is plastic and sticky when wet and very hard when dry. Below approximately 40 inches, and to an indefinite depth, there is no change in the material.

Large cracks develop in these soils if dry periods last so long that the subsurface dries out. More detailed profile descriptions of each of these soils are given under Sharkey clay, undulating phase, and Alligator clay, level phase.

Use and management.—Cotton, soybeans, and oats are the usual crops. Corn is generally grown only in areas that have been freshly cleared or that have had large quantities of green-manure crops plowed under. Occasionally alfalfa is grown, but lime is necessary for successful growth, and drainage is usually beneficial. If fertilizers are added to the soils, yields are increased. Nitrogen is especially needed if corn, cotton, or oats are to be grown. Before other fertilizers are added, however, the soil should be tested to determine the need for them. The expense of installing drainage may offset the gain, but as a rule, crop yields are increased if drainage is provided.

Sharkey and Dowling clays (0 to 2 percent slopes) (Sc).—The soils of this mapping unit are similar to Sharkey clay, undulating phase, and Dowling silt loam and clay loam. The Dowling soil of this unit, however, has a finer surface texture than that of Dowling silt loam and clay loam.

The soils occupy comparatively large areas in association with Forestdale and Sharkey soils. They lie in broad, flat depressions closely related to swamps and low swags. Both surface runoff and internal drainage are slow. They are slightly acid to alkaline and have a good supply of organic matter. To a large extent they are still in forest. The cover consists of a fairly thick stand of hardwoods, a heavy undergrowth of brush, vines, briars, canes, and occasionally rushes and swampgrass.

Use and management.—The crops on these soils are cotton, soybeans, oats, hay, and some corn. Yields are low except where considerable drainage has been provided or there has been unusually good management.

The soils must be protected from floods by dikes or levees if they are to be farmed. If possible, drainage outlets should be provided to carry off floodwaters rapidly.

The soils are difficult to work because they are sticky and plastic when moist and hard when dry. The best time to break or turn them is when they are saturated. The clods will crumble into small pieces after they have weathered and dried, and the soils will then work easily throughout the period of cultivation.

SOUVA SERIES

This Souva series consists of somewhat poorly drained alluvial soils derived from Mississippi River sediments. The soils occupy low swags or depressional areas and are frequently covered by water.

Souva silt loam, level phase (0 to 2 percent slopes) (Sk).—This somewhat poorly drained soil usually occurs in small areas. It occupies shallow depressions, generally in the western part of the county. A few areas occur elsewhere. This soil of the low terraces usually occurs on long strips in old stream channels.

To a great extent the parent materials were derived from local alluvium washed or sloughed from such soils as Bosket, Dubbs, and Dundee, which occupy higher positions nearby. This soil is closely associated with and resembles soils of the Ark series but is more poorly drained. It is flooded frequently; surface runoff is slow to ponded; internal drainage is medium to slow.

Profile in a cleared field:

- 0 to 8 inches, dark-brown or dark grayish-brown fine granular friable silt loam; medium acid to alkaline.
- 8 to 26 inches, gray to dark-gray fine granular friable silty clay loam, mottled prominently with shades of gray, yellow, and brown; medium acid to neutral.
- 26 to 42 inches +, gray to dark-gray coarse blocky firm clay or silty clay, mottled with light gray and brown; medium to slightly acid.

The supply of organic matter is fairly high. Plant roots readily penetrate the surface layer, and if not stopped by a high water table, they penetrate the subsurface layer fairly easily. Yields are often considerably reduced by a high water table caused by rains during the crop season.

Use and management.—Most of this soil has been cleared and is farmed. Cotton is the principal crop, but corn is planted occasionally. Usually these crops are followed by burclover, which is turned under.

Dikes are necessary to protect the soil from floodwaters. If practical, open drainage ditches should be used to provide outlets for excess water. Because of the small size of the areas, drainage of this soil may be practical only if other nearby soils will also benefit.

Souva silt loam, gently sloping phase (2 to 4 percent slopes) (Sh).—This soil occupies a very small total acreage made up of areas lying close to depressions. Crop failures caused by excess moisture are not so frequent on this phase as they are on the level phase of Souva

silt loam. Profiles of the Souva silt loam, level phase, and this phase are essentially the same.

Use and management.—Because of its better drainage, this gently sloping phase is somewhat more productive than the level phase. Tillage can be carried on a little earlier after wet seasons, and the crops can therefore be kept freer of weeds and grass. Management of the two phases is usually the same, especially when they occur together. Generally the two occur in the same field, and the same crop is planted on both.

TUNICA SERIES

The Tunica series consists of moderately well drained, gently sloping to undulating soils derived from Mississippi River alluvium. They occur in small tracts, generally on the higher elevations in slack-water areas of low bottoms. The Tunica soils resemble the Sharkey soils with which they are closely associated, except that they have a sandy material beneath the subsoil. The Sharkey soils, in contrast, have clay beneath the subsoil.

Tunica clay and silty clay, level phases (0 to 2 percent slopes) (Tc).—These slightly acid, moderately well drained soils are derived from alluvium brought in by the Mississippi River. They occur in rather narrow bands scattered throughout the slack-water areas of the county in association with the Sharkey soils. Their surface runoff is slow, and internal drainage is medium, but they are better drained than the associated Sharkey soils. The supply of organic matter is fairly large in the surface layer.

Profile in a cleared area:

- 0 to 5 inches, brownish-gray moderate medium blocky firm clay to silty clay; slightly acid.
- 5 to 34 inches, dark grayish-brown or light brownish-gray strong medium blocky very firm clay, mottled with shades of gray and brown; slightly acid.
- 34 to 42 inches +, mottled brown, yellow, and gray friable sandy loam; slightly acid.

Use and management.—Nearly all of this unit has been cleared and is now farmed. Soybeans, corn, hay, oats, and alfalfa are grown, but cotton is the principal crop. The soils need dikes to protect them from river floods, and they need drainage to remove local floodwaters.

Organic matter needs to be built up. Winter legumes and summer manure crops will add nitrogen to the soil. Soil samples should be sent to the Mississippi State College to be tested in order to determine the need for other fertilizers or supplements.

Tunica clay and silty clay, undulating phases (2 to 5 percent slopes) (Td).—These soils occur on broad first bottoms where the slope varies slightly from place to place. Soils of this mapping unit are very similar to Sharkey clay, undulating phase, except that they have patches of silty clay in the surface layer and a silty or sandy substratum. They are also better drained than the undulating phase of Sharkey clay. During long dry periods, these soils crack to a considerable depth.

The soil profile of this mapping unit is very similar to that of the level phases of Tunica clay and silty clay. In higher areas mot-

ting sometimes appears a little lower in the profile, which indicates slightly better drainage.

Use and management.—Most of this mapping unit has been cleared and is now farmed. The usual crop is cotton, but the soybean acreage is increasing rapidly. The cotton crop is often followed by vetch or burclover, which is turned under.

The soils need additional organic matter and plant nutrients. The need for plant nutrients should be determined so that suitable fertilizers will be used. If areas are large enough to make it practical, drainage should be installed. All of this mapping unit is protected by the main river levee.

Tunica and Dundee soils, level phases (0 to 2 percent slopes) (Ta).—This mapping unit consists of patches of both Tunica and Dundee soils so small and intricately combined that they could not be mapped separately. A few small areas of other soils have been included in the unit. The soils are moderately well drained and occur along the margins of the low terraces and bottoms in the western and central parts of the county.

Use and management.—Most of this unit has been cleared and is now cultivated. Cotton, soybeans, corn, oats, and annual hay are grown, and there is some pasture. Crop yields are moderate except where the soils have been given special management.

If possible to obtain drainage outlets, open ditches should be provided to drain off floodwaters. Organic matter is needed to make the soils more fertile and to improve tilth. Winter cover crops, such as oats, rye, burclover, and vetch, or some combination of these, should be grown. If it is feasible to grow them, summer legumes should be planted to add nitrogen to the soil.

Tunica and Dundee soils, undulating phases (2 to 5 percent slopes) (Tb).—This mapping unit consists of a mixture of moderately well drained Tunica and Dundee soils, which occur on the margins of low terraces and low bottoms in the central and western parts of the county. The profile in some areas is similar to that of Tunica soils, and in others it resembles that of Dundee soils. In still other areas it differs somewhat from both.

These soils occur in rather small tracts and have a small total acreage. They are associated with such soils as the Sharkey and Alligator on the bottoms, and with the Clack, Bosket, Dubbs, Dundee, and Forestdale on the low terraces. They are similar to Tunica and Dundee soils, level phases, but are a little more sloping and have somewhat more irregular relief.

Use and management.—Most of this unit has been cleared and is now farmed with adjoining areas. Cotton, soybeans, corn, and oats are the usual crops. Yields are only fairly good. Drainage is needed to remove floodwaters quickly. Soil-improving crops should be planted to add nitrogen to the soil and to improve tilth. Fertilizers should be used to meet the needs indicated by soil tests.

Tunica, Commerce, and Sharkey soils (0 to 5 percent slopes) (Te).—This mapping unit consists principally of Tunica, Commerce, and Sharkey soils, but includes minor areas of other soils. It lies between the levee and the Mississippi River, and most of it is covered

by trees and heavy undergrowth. It is difficult to gain access to this unit, which is often changed by floods. Detailed profile descriptions of Tunica, Commerce, and Sharkey soils are given elsewhere in this report (see table of contents).

Use and management.—Most of this unit is forested. In areas cleared and cultivated, floods may destroy the crops. Usually the cleared areas are planted to cotton, but occasionally to soybeans, corn, and annual hay. Some areas are pastured.

As the soils lie between the river and the levee, little can be done to protect them from floodwaters. Winter legumes would be of great benefit, but they probably would be drowned out. Readily available fertilizers appear to be the best source of plant nutrients, as the immediate crop will benefit and little of the fertilizer will be left after the crops mature. Any soluble fertilizer not used by the crop will be leached out by winter and spring floods. However, before fertilizers are purchased, soil samples should be sent to the Mississippi State College for testing in order to determine just what fertilizers or supplements are needed.

SOIL MANAGEMENT ⁴

Successful agriculture in any area such as Tunica County depends upon proper soil use. Of the many factors to be considered in determining soil use, the physical characteristics of the soils are among the most important. In Tunica County these characteristics have not always been given enough consideration. Inadequate crop yields, deteriorating soil structure, erosion, and a gradually diminishing supply of available plant nutrients and organic matter in the soil have resulted.

In this county many things have contributed to poor management. Often farm operators have lacked knowledge of good practices. Economic limitations have prevented many of them from using better methods. Poor practices have often stemmed from the tenure system. Under this system, farm rentals have been on an annual basis, and there has been no assurance that the lease would be renewed. No compensation has been allowed the tenant for permanent improvements, so he assumed the financial risk if he built ditches, limed the land, grew green-manure crops, built fences, or made other improvements.

In Tunica County some of the soils now farmed are not suited to cultivation, and others, now used only for permanent pastures or forests are suited to cropping. The soils differ somewhat in management requirements because they differ in workability, conservability, and productivity, all of which are directly related to management. Workability indicates the ease with which tillage, harvesting, and similar field work can be done. Conservability refers to the ease with which productivity and workability can be maintained or improved. The choice of suitable crops and rotations is perhaps the most important of these management problems.

Some general recommendations for land use and soil management are discussed in the following pages. The term "land use" refers to

⁴ Much of the material in this chapter was taken, with modifications, from Miss. Agr. Expt. Sta. Bul. 475 (6).

such broad uses as cropland, permanent pastures, and forests. Soil management refers to such practices as choice and rotation of crops, application of commercial fertilizers and lime, tillage, and methods of water control. The practices suggested are those that best fit the physical nature of the soils. Each farmer needs to consider also the kind of farming that he wants to do and the practices he can afford.

Field layout and row direction.—If feasible, place field roads, turn-rows, and field boundaries so that they will coincide with boundaries separating soils needing different management. An entire field can then be given uniform fertilizer treatment and like management. Roads that cut across a soil boundary or a field tend to divide the field into smaller units that are not suitable for mechanized farming. Escarpments and banks of bayous, or the upper boundaries of soils that are sloping to moderately steep, are ideal locations for roads.

Slope, soil type, and tillage methods are all important in determining row direction. Plan rows on poorly drained practically level soils so they will provide the best possible runoff of water. On undulating soils that have somewhat poor or poor drainage, each row should have enough slope to carry the surface water to a ditch or other outlet.

Some soils have subsoils coarse enough to allow water to penetrate them readily; they have moderate or better internal drainage. On such soils run the rows on the contour (with the slope or without fall) so that each row will hold the water that falls in it. If it can be avoided, do not allow water to run off of these soils, or off of any higher area onto them. To conserve moisture and to prevent erosion on gently sloping or on more strongly sloping soils, run the rows on the contour. Make the rows as long as possible for economy in tillage and harvesting, especially if mechanized equipment is to be used.

Drainage.—Much of the land in Tunica County must be drained if it is to be farmed. Before extensive drainage systems are planned, however, the productivity and crop suitability of the soil should be considered. Yields that may be expected from each of the Tunica County soils, if they have been properly drained and managed, are shown in table 3.

Soil maps can be used as a guide in laying out a system of surface drainage for the individual farm. If possible, locate drainage ditches in natural low depressions. Choice of the type of ditch to be used should be governed by the size of the watershed and by the soil types that occur within it. Sandy soils for example, have much less runoff than clay soils. Consequently, adequate drainage of clay soils requires larger and more numerous ditches.

To drain isolated depressions, it is sometimes necessary to cut ditches across ridges, but avoid this if possible. Run ditches parallel to rows rather than across them, for it is difficult to work short rows with power machinery.

Cropping system.—A definite cropping plan is important. Workability and other characteristics of the soils, drainage possibilities, and suitability of various crops should be considered. The system selected should allow efficient crop production and improve or maintain the productivity of the soils.

Cotton is the principal cash crop. It should have the most favorable position in the cropping system on all the soils where it can be grown readily. Under good management, the sandier well-drained soils

will produce high yields of cotton annually. On the heavier clay soils, grow cotton only every other year or every third year. Rotate the cotton with a soil-building crop such as soybeans.

In planning a system, first use the soil map to determine the approximate location and number of acres of each soil type on the farm. Then read the descriptions of these soils in the section on Soil Series, Types, and Phases. After the characteristics of each soil type are well in mind, study the section on management groups. This section places all the soils of the county in seven groups. The soils in one group require about the same kind of management. By comparing the present use and management of the soils with that suggested, weaknesses in present management can be discovered. Some of the weaknesses in management common to the county are:

1. The cutting of fields into 40-acre blocks and running turnrows and ditches in straight lines.
2. Cutting ditches across ridges.
3. Planning field layouts so that two or more soils widely different in characteristics are in the same field.

If at all feasible it is better to plan fields so that soil boundaries are field boundaries. Make the rows as long as possible so that they can be tilled with power machinery. Turnrows and roads usually can be run along the borders of fields, and secondary drainage ditches can be placed in low swags or depressions.

Fertilizers, organic matter, and lime.—Most of the soils in this county are depleted of nitrogen and organic matter; some need lime; and a few may eventually develop shortages of phosphorus and potassium. The soils vary in amount of amendments needed. If they are to be managed efficiently, soil samples should be analyzed. County agents and other agricultural workers can explain how soil samples should be collected and where they can be sent for analysis. Soil tests may explain why yields from a particular field have been decreasing over a period of years.

The condition of the soil also needs to be considered. If a soil is poorly drained, compacted, or otherwise in poor condition, plants cannot use efficiently the nutrients applied or already present.

Nitrogen and organic matter.—For the usual crops on the soils of this county, nitrogen is the fertilizer most needed. The methods of applying nitrogen and organic matter to crops will vary from farm to farm, depending on the soils, the type of farming practiced, and the resources and desires of the operator. The Agricultural Experiment Station or Extension Service will furnish up-to-date recommendations.

YIELD ESTIMATES

Yields are influenced by many factors. Consistently high production on any soil is usually the result of good management, whereas low production can often be traced to poor management.

The estimated average acre yields of various crops on each of the Tunica County soils under two levels of management are listed in table 3. In columns A are average yields under management now prevalent in Tunica County. These yields were obtained by farmers who failed to use good methods, such as a definite plan of crop rotation, needed fertilizers for all crops (not cotton alone), and contour tillage.

In columns B are yields obtained by progressive farmers who used good management practices such as wise choice and rotation of crops; correct use of commercial fertilizers, lime, and manure; return of organic matter to the soil; proper tillage; and, if needed, mechanical methods of water control. The yield figures in columns B can be considered as production goals that can be attained by using good management practices.

In order to arrive at average yield figures given in table 3, several farmers kept records of yields over a 5-year period. Such records were long enough to reflect the usual wide seasonal variation in rainfall, temperature, and insect and disease injury. Figures given for pasture yields are not very reliable, as there were no extensive pastures in the Delta area until recently. Pasture yields were expressed by the estimated number of acres needed to graze an animal unit through the grazing period.

One of the first steps in obtaining high yields is to select crops suited to the particular soil, since some management practices and some soils will produce high yields of one crop but only low yields of another. More corn will be produced, for example, on the lighter textured soils under comparable management than on heavy clay soils.

Cotton is the principal cash crop in the county. Most farmers, therefore, need to know which of their soils are most suitable for cotton. Choose crops to be grown on the other soils with equal care. Management of a crop may be influenced by its proportionate acreage or by other factors such as its relation to the farm business as a whole.

Figures shown in table 3 were based principally on information gathered from interviews with farmers and other agricultural workers who were in a position to observe soils and crop yields in the county. These figures are as accurate as can be expected without detailed and lengthy research and will furnish some idea of what yields can be expected from the different soils under various types of management.

USE SUITABILITY OF SOILS

Soils differ in their workability, conservability, and productivity. One soil requires special management to increase workability. Another is productive and easily tilled but needs special management to increase its capacity to store water and plant nutrients. The soils of Tunica County can be arranged in seven groups according to their chief management requirements. Table 4 lists the soils in each group and gives suitable cropping systems for each group.

Group 1.—Soils in this group are the most productive in the county; all are very fertile. They occupy approximately a fourth of the total land area. They are well drained to fairly well drained because they have sandy or silty surface layers and subsoils that allow water to move through them. They require very little artificial drainage.

These nearly level to undulating (mainly undulating) soils cover about 24 percent of the county. Where they are level to nearly level, a system of W-type ditches furnishes ample surface drainage. Contour cultivation of the moderately sloping soils is necessary to prevent loss of topsoil and to conserve moisture.

TABLE 3.—*Estimated average acre yields of principal crops on the soils of Tunica County, Miss., under two levels of management*

[Yields in columns A are those obtained under common management; those in columns B are obtained under good management. Blank spaces in columns indicate crop is not commonly grown under the management specified.]

Soil	Cotton		Corn		Soybeans (seed)		Oats		Alfalfa hay ¹		Rice ²		Permanent pasture ³		Conservability ⁴	Workability ⁵
	A	B	A	B	A	B	A	B	A	B	A	B	A	B		
	Lb.	Bu.	Lb.	Bu.	Lb.	Bu.	Lb.	Bu.	Tons	Tons	Bu.	Bu.	Acres per animal unit	Acres per animal unit		
Alluvial soils (undclassified) ⁶																
Alligator clay:																
Level phase ⁷																
Undulating phase ⁸	300	425	10	20	15	27	20	40					6.5	3.0	Fair	Poor.
Alva and Eupora soils ⁹	300	400	5	15	12	22	15	35			50	70	6.0	4.0	Very good	Poor.
Ark soils	375	600	25	50	15	30	15	40			45	70	6.2	4.3	Very good	Poor.
Bosket very fine sandy loam:	600	700	45	75	25	40	35	65					4.2	2.2	Very good	Poor.
Level phase	600	750	45	75	25	40	45	75	2	4			3.6	2.2	Very good	Fair.
Undulating phase	600	750	40	70	25	35	40	70					4.8	2.2	Excellent	Excellent.
Bosket sandy loam:													4.0	2.4	Very good	Excellent.
Level phase	550	750	45	75	25	40	45	75	2	3			4.3	2.5	Excellent	Excellent.
Undulating phase	500	700	40	70	20	35	40	70	2	3			4.5	2.7	Very good	Excellent.
Bowdre soils	350	475	20	45	15	25	15	35					4.5	2.5	Very good	Fair.
Clack loamy sand:																
Level phase	100	5	5	10			5	15					7.3	4.5	Poor	Fair.
Undulating phase	100	5	5	10			5	10					7.4	4.7	Poor	Fair.
Clay and sand banks:																
Gently sloping																
Sloping																
Clay soils (undclassified)	350		10	20	10	25	20	35					6.5	4.5	Very poor	Very poor.
Collins silt loam ¹⁰	500	700	40	60	20	35	30	60					6.8	4.8	Very poor	Very poor.
Commerce silt loam and very fine sandy loam	800	800	50	75	25	40	45	75					5.8	2.3	Very good	Very poor.
Commerce silt loam, shallow phase	575	675	40	60	25	40	30	60					3.0	1.5	Very good	Very good.
Crevasse sandy loam:													3.2	1.7	Excellent	Excellent.
Level phase	150	300	10	20	10	10	10	20					3.5	1.8	Excellent	Excellent.
Undulating phase	100	250	5	15			5	15					7.2	4.4	Poor	Fair.
Dowling soils													7.4	4.6	Poor	Fair.
Dowling silt loam and clay loam													5.0	2.3	Very good	Very poor.
Dubbs silt loam and very fine sandy loam:													5.0	2.3	Very good	Very poor.
Level phases	500	650	45	65	25	40	35	65					4.0	2.2	Excellent	Excellent.
Undulating phases	450	600	40	60	20	35	30	60	2.5	4			4.2	2.3	Excellent	Excellent.

Dubbs very fine sandy loam:	560	726	40	65	20	40	35	65	2.5	4			4.0	2.2	Excellent.
Level phase.....	575	675	40	60	20	35	30	55					4.2	2.3	Excellent.
Undulating phase.....															
Dumdee silt loam:	490	690	35	55	20	35	25	55					4.0	2.2	Excellent.
Level phase.....	450	650	30	50	15	30	20	50					4.2	2.3	Excellent.
Undulating phase.....															
Dumdee silt loam and very fine sandy loam:	400	600	35	55	20	35	25	55					4.0	2.2	Excellent.
Level phases.....	375	560	30	50	15	30	20	50					4.2	2.4	Excellent.
Undulating phases.....	625	725	45	65	25	40	35	65					4.6	2.4	Excellent.
Dumdee very fine sandy loam, level phase.....															
Dumdee silty clay loam:	375	590	20	40	18	30	20	45					4.5	2.4	Fair.
Level phase.....	325	550	15	35	12	25	15	40					4.6	2.6	Fair.
Undulating phase.....															
Forestdale silt loam:	340	450	20	45	15	25	20	45					4.8	2.5	Very good.
Level phase.....	300	425	20	40	12	20	15	40					4.6	2.3	Very good.
Undulating phase.....															
Forestdale silty clay loam-clay:															
Level phases.....	325	425	20	40	15	25	20	45					4.8	2.6	Good.
Undulating phases.....	275	400	15	35	12	20	15	40					4.7	2.4	Good.
Mhoon silt loam.....	325	450	25	45	15	30	25	50					4.0	2.2	Good.
Mhoon and Sharkey soils.....	275	400	25	40	15	35	30	55					4.6	2.6	Good.
Robinsonville silt loam and very fine sandy loam.	650	900	50	75	25	42	45	75					3.2	1.5	Excellent.
Riverwash.....															
Sand banks, sloping.....	300	400	5	15	12	22	15	35	2.5	4	45	65	6.2	4.0	Very poor.
Sharkey clay, undulating phase ¹															
Sharkey silty clay loam:															
Level overwash phase.....	325	450	15	45	15	30	20	40					5.5	3.5	Fair.
Undulating overwash phase ²	375	450	15	45	15	30	25	45	2.5	4	40	60	5.5	3.5	Fair.
Sharkey-Alligator clays, level phases ³	300	425	10	20	15	27	20	40					6.0	4.0	Poor.
Sharkey and Dowling clays ⁴	200	400	10	30	15	25	25	40					65	3.6	Poor.
Souva silt loam:															
Level phase.....	300	425	20	40	15	30	15	30					4.8	2.2	Fair.
Gently sloping phase.....	300	425	20	40	15	30	15	30					4.8	2.4	Good.
Tunica clay and silty clay:															
Level phases.....	375	500	20	30	20	30	25	50	3	4			4.7	2.6	Poor.
Undulating phases.....	325	450	15	25	18	27	20	45	3	4			4.8	2.7	Poor.
Tunica and Dumdee soils:															
Level phases.....	375	500	20	35	15	30	20	40					4.5	2.3	Good.
Undulating phases.....	325	450	15	30	10	25	15	35					4.6	2.4	Good.
Tunica, Commerce, and Sharkey soils.....	340	475	20	40	15	30	15	30					4.4	2.2	Poor.

¹ Allia undonbiedly could be grown on many other soils of the county. Because of insufficient data, yields for only a few soils have been shown.

² Yield estimates for rice of limited accuracy because crop has been grown only a few years and on only a few soils.

³ Average number of acres required to furnish without injury to the pasture adequate grazing for 1 animal unit for a grazing season of 215 days. An animal unit is equivalent to 1 mature cow, steer, or horse, 5 hogs, or 7 sheep or goats.

⁴ Conservability refers to the ease with which productivity and workability can be maintained or improved.

⁵ Workability indicates the ease with which tillage, harvesting, and similar field work can be done.

⁶ Yields in columns A were obtained from areas with no artificial drainage; those in columns B from adequately drained areas. Damage from high water every 4 to 6 years was not considered in arriving at yields.

TABLE 4.—*Soils of Tunica County, Miss., arranged by management groups, and suggested cropping systems*

Management group and soil	Suggested cropping systems		
	Cotton	Cotton and grain	Hay, pasture, or grain
Group 1----- Ark soils Bosket sandy loam: Level phase Undulating phase Bosket very fine sandy loam: Level phase Undulating phase Commerce silt loam, shallow phase Commerce silt loam and very fine sandy loam Dubbs silt loam and very fine sandy loam: Level phases Undulating phases Dubbs very fine sandy loam: Level phase Undulating phase Dunde silt loam: Level phase Undulating phase Dunde silt loam and very fine sandy loam: Level phases Undulating phases	Cotton; plant vetch or bur-clover in fall for cover crop.	Cotton; burclover in fall, harvest seed in spring; corn second year.	Ryegrass and white, red, or crimson clover; may be followed by grain sorghum or millet for summer grazing; possibly alfalfa for hay or for temporary grazing.

Dundee very fine sandy loam, level phase Robinsonville silt loam and very fine sandy loam Souva silt loam: Level phase Gently sloping phase	Cotton followed by vetch in fall for cover crop.	Cotton; soybeans for oil second year.	Summer fallow; plant alfalfa in fall and leave for 3 years.
Group 2----- Alva and Eupora soils Bowdre soils Collins silt loam Dundee silty clay loam: Level phase Undulating phase Mhoon silt loam Tunica clay and silty clay: Level phases Undulating phases Tunica and Dundee soils: Level phases Undulating phases	Cotton followed by vetch or burclover in fall for cover crop; cotton alone second year; soybeans third year for oil or cover crop.	Corn; soybeans for oil second year; cotton third year, and vetch or burclover in fall for cover crop.	Small grain (oats or wheat) followed by lespedeza the first year; same sequence the second year; corn the third year; small grain followed by lespedeza the fourth year.
Group 3----- Forestdale silt loam: Level phase Undulating phase Tunica, Commerce, and Sharkey soils (not protected by levee)			

TABLE 4.—*Soils of Tunica County, Miss., arranged by management groups, and suggested cropping systems—Continued*

Management group and soil	Suggested cropping systems		
	Cotton	Cotton and grain	Hay, pasture, or grain
Group 4----- Alluvial soils (unclassified) Forestdale silty clay loam-clay: Level phases Undulating phases Sharkey silty clay loam: Level overwash phase Undulating overwash phase	Cotton followed by winter peas as cover crop; winter peas the second year for seed followed by fallow; cotton the third year. Fallow in winter following harvest.	Soybeans for oil first and second years; cotton the third year.	Wheat or oats followed by red clover the first year; red clover the second year; corn the third year.
Group 5----- Alligator clay: Level phase Undulating phase Clay soils (unclassified) Moon and Sharkey soils Sharkey-Alligator clays, level phases Sharkey clay, undulating phase	Cotton followed by winter peas in fall; harvest peas for seed in spring; fallow the second year.	Cotton; soybeans for oil second and third years; oats for grazing the fourth year.	Corn the first year followed by oats in fall; oats the second year, followed by Ladino clover and tall fescue in fall; fescue and Ladino clover for 3 years.

<p>Group 6-----</p> <p>Clay and sand banks: Gently sloping Sloping Dowling soils Dowling silt loam and clay loam Sharkey and Dowling clays</p>	<p>Cotton followed by vetch or burclover in fall for cover crop; cotton second year; soybeans third year for oil or cover crop.</p>	<p>Corn; soybeans for oil second year; cotton third year, and vetch or burclover in fall for cover crop.</p>	<p>Small grain (oats or wheat) followed by lespedeza the first year; same sequence the second year; corn the third year; small grain followed by lespedeza the fourth year.</p>
<p>Group 7-----</p> <p>Clack loamy sand: Level phase Undulating phase Crevasse sandy loam: Level phase Undulating phase Riverwash Sand banks, sloping</p>	<p>Best suited to drought-resistant hay, pastures, winter grazing, or forests.</p>		

High yields of cotton and corn can be obtained if fertilizer recommendations are followed. Tests indicate that a heavy winter cover crop such as hairy vetch or burclover supplies approximately 40 to 50 pounds of available nitrogen. Therefore, if a heavy growth of a winter legume has been turned under, little or no nitrogen from commercial fertilizers will be needed to maintain high yields.

Have these soils tested before alfalfa or clover is planted to determine available plant nutrients and mineral deficiencies. Fertilizers or supplements can then be added as they are needed.

Group 2.—Soils in this group are very fertile and highly productive. They do not occupy so large an area as the soils in group 1. They have a heavier textured surface soil or plow layer and require more artificial drainage than the soils in group 1, but they are fairly well drained internally. They usually occur on slight ridges, or areas of stronger slope. If the soils on moderate slopes are to be cultivated, run the rows across the slope, following the ridge. Do not cultivate the soils that lie on the steeper slopes.

Group 3.—Soils in this group are not so fertile as those in groups 1 or 2. Their surface layer or plow layer is silty, and tillage is therefore easier. The subsoil, however, is high in clay and silt and retards the downward movement of water. Because of their poor internal drainage, productivity is limited. These soils usually occur on undulating to level topography. Where they are level, an intensive system of W-ditches is necessary to provide adequate drainage.

The soils are fairly well adapted to cotton and corn, but winter legumes or a summer legume should be included in the cropping system each year to provide nitrogen. These soils are excellent for pasture and lespedeza.

Group 4.—Poor internal drainage limits the productivity of these soils and increases management difficulties. The high clay and silt content of the subsoils slows the downward movement of water. To remove surface water, W-type or V-type ditches should be used.

Organic matter is essential if these soils are to produce well. Nitrogen content will be increased by including in the cropping system a rotation in which summer legumes such as soybeans are grown every other year. The soils are fairly well suited to cotton and are very suitable for soybeans, lespedeza, and pasture.

Group 5.—Soils in this group cover approximately a third of the land in the county. They are very fertile, but they have characteristics that greatly limit their productivity. The heavy-textured clay or silty clay surface layers make cultivation difficult. Furthermore, the clay or silty clay subsoils allow very little water to move through the soil. Accordingly, it is necessary to provide extensive drainage systems to remove the surface water adequately.

Usually the best results are obtained when soils of this class are plowed in the fall. The soils need nitrogen and organic matter, but it is hazardous to grow winter legumes for green manure because they have to be plowed under in the spring when erosion is active. Use

contour cultivation to prevent erosion where these soils are on moderate slopes. A rotation that keeps about two-thirds of the land in close-growing crops is also very desirable to prevent loss of topsoil.

These soils are fairly well adapted to cotton, but it is very difficult to obtain a good stand if the early spring is unusually wet. Average annual yields for a 5-year period are approximately three-fourths bale per acre. If the soils are properly managed, corn yields 40 to 50 bushels per acre. The soils are very suitable for soybeans and small grains, and, if good surface drainage is provided, alfalfa does well.

Group 6.—These soils occupy depressions or low swags and therefore receive frequent overflows. They are so poorly drained that they require artificial drainage if they are farmed. Their location makes them of great assistance in placing secondary and primary drainage ditches and canals.

Unless they have been adequately drained, the soils are suitable only for temporary pastures or for temporary grazing during dry periods of the year. If they have been drained adequately, cotton and corn can be grown, but winter or summer legumes should be included in the cropping system each year to provide nitrogen and organic matter. These are excellent soils for pasture and lespedeza. If they have been drained, cropping systems and management are the same as for soils in group 3.

Group 7.—Soils in this group vary so widely in their characteristics that only very general suggestions can be made concerning them. The soils of the Clack and Crevasse series are very sandy. Usually they are the remains of old sand boils, or because of their sandiness, sand boils develop in them when the river is high. They are so sandy that they do not have enough moisture to support growing field crops except during winter, spring, or other rainy seasons.

The soils can be used to grow small grains, early vegetables, and early hay, or they can be pastured. Only drought-resistant hay is suitable for the dry summer and fall seasons, and drought-resistant pasture grasses must be seeded to obtain good pasture stands. Some of these soils are best left undeveloped or should be developed as farm woodlots.

Unless they have been protected from floods, soils mapped as Riverwash are so changeable that they are of little use except for woodlots. A single flood often changes them completely. Sometimes the soils disappear entirely during a flood, or an area may double in size. A flood may cover an area of sand by a deposit of silt, or silty or clay soil may be covered by 2 to 4 feet of sand. These soils occupy only a very limited area.

Soils classed as Sand banks, sloping, are often droughty in dry seasons and erode during rainy seasons. They are not suitable for many of the crops usually grown in the county. They can be used for early-maturing spring crops, however, and for drought-resistant pastures or hay. The soils are suitable for farm woodlots if the wood can be utilized.

CAPABILITY GROUPS OF SOILS

The capability grouping is an arrangement of soils according to their relative suitability for crops, grazing, forestry, or wildlife, and the difficulties or risks in using them. The estimate of this suitability is a consensus of several persons who know the soils and the agriculture of the area in which they occur. Soils that are nearly level, well drained, free from overflow, fairly fertile, and otherwise not limited are placed in class I. They are widely adaptable, and the user of them has many choices open to him. He can use his class I soils for crops without special practices, and can choose one of several cropping systems; or if he wishes he may use the soil for pasture or for some other purpose.

Soils are placed in class II if they are a little less widely adaptable and thus more limited than those in class I. A gently sloping soil, for example, must be farmed on the contour, kept under vegetation most of the time, or handled in some other manner in order to control erosion. Other soils may be included in class II because they are too droughty, too wet, or not deep enough. For some soils, climate may limit cropping to the extent that they fall in class II, although climate is not recognized as a limiting factor in Tunica County.

Class III soils have more narrow adaptations for use or more stringent management requirements than class II soils. Nevertheless, class III soils can be used for regular cropping. Soils more limited and narrower in crop adaptations than those of class III, but still usable for tillage part of the time or with special precautions, are placed in class IV.

Soils not suitable for cultivation, or on which cultivation is not advisable, are in classes V, VI, VII, or VIII. Class V, not used in Tunica County, includes only those soils not subject to erosion but totally unsuitable for cultivation because of standing water or frequent overflows. Class VI contains the soils which may be steep or droughty but will produce fairly good amounts of forage or forest products. As a rule class VI soils should not be cultivated, but some of them can be disturbed enough to prepare them for planting trees or seeding a pasture mixture. Soils in class VII are more limited than those in class VI and usually give only fair to poor yields of forage or wood products. Class VIII, not used in Tunica County, consists of soils so severely limited that they produce little useful vegetation. They may make up attractive scenery, or may be parts of useful watersheds. Some may have a little value for wildlife.

Subclasses.—The soils in an individual capability class present use and management problems of about the same magnitude. But the kinds of problems differ because the soils included are different. Class II in this county, for example, consists of some well-drained undulating soils that are subject to erosion, other somewhat poorly drained soils limited chiefly by too much water, and still other somewhat excessively drained soils that are subject to droughtiness. It is convenient to recognize capability subclasses based on these kinds of limitations. As many as four subclasses may be recognized, according to the following dominant limitations: Risk of erosion (e), excess water (w), shallow or droughty soils (s), and extremely hazard-

ous climate (c). Subclasses are denoted by a small letter following the class number, such as IIc, IIw, or IIs.

CAPABILITY CLASSES AND SUBCLASSES

Class I.—Soils safe for use under intensive cultivation, without special practices to control runoff or erosion, and which may be expected to produce high yields with good soil and crop management.

Class II.—Soils that can be used for tilled crops, but under slight risks of erosion or other slight limitations.

IIe: Generally well-drained productive soils, gently sloping.

IIw: Moderately well-drained to somewhat poorly drained soils.

IIs: Soils somewhat limited by shallowness or droughtiness.

Class III.—Soils that can be used for tilled crops but under moderate risks of erosion or some other moderate limitations.

IIIe: Moderately well drained to poorly drained undulating soils.

IIIw: Slowly to very slowly drained soils.

IIIs: Moderately well drained to excessively drained soils subject to droughtiness, and somewhat poorly drained to poorly drained soils having such fine textures that they are extremely difficult to till most of the time.

Class IV.—Soils that have severe limitations or high risks of soil damage when used for cultivation, and when so used require special management.

IVe: Gently sloping erodible soils.

IVw: Poorly drained soils of variable textures, subject to frequent flooding.

IVs: Sandy soils.

Class VI.—Soils too steep, too wet, or too sandy for cultivation, except occasionally in preparation for reseeding or replanting to trees.

VIe: Sloping soils subject to very serious erosion.

Class VII.—In this county, soils unsuited to cropping because of frequency of damage by flooding, deposition, or scouring.

VIIs: Riverwash.

The capability class and subclass for each soil is shown in the following list.

	Capability class and subclass
Alligator clay:	
Level phase (Aa).....	IIIs.
Undulating phase (Ab).....	IIIe.
Alluvial soils (unclassified) (Ac).....	(¹)
Alva and Eupora soils (Ad).....	IIlw.
Ark soils (Ae).....	IIw.
Bosket sandy loam:	
Level phase (Ba).....	I.
Undulating phase (Bb).....	IIe.
Bosket very fine sandy loam:	
Level phase (Bc).....	I.
Undulating phase (Bd).....	IIe.
Bowdre soils (Be).....	IIs.
Borrow pits (Bp).....	(¹)

¹ Not classified for capability.

	<i>Capabil- ity class and sub- class</i>
Clack loamy sand:	
Level phase (Ca)	IVs.
Undulating phase (Cb)	IVs.
Clay and sand banks:	
Gently sloping (Cc)	IVe.
Sloping (Cd)	VIe.
Clay soils (unclassified) (Ce)	III.
Collins silt loam (Cf)	I.
Commerce silt loam and very fine sandy loam (Cg)	I.
Commerce silt loam, shallow phase (Ch)	IIIs.
Crevasse sandy loam:	
Level phase (Ck)	IIIs.
Undulating phase (Cl)	IIIs.
Dowling silt loam and clay loam (Da)	IIW.
Dowling soils (Db)	IVw.
Dubbs silt loam and very fine sandy loam:	
Level phases (Dc)	I.
Undulating phases (Dd)	IIe.
Dubbs very fine sandy loam:	
Level phase (De)	I.
Undulating phase (Df)	IIe.
Dundee silt loam and very fine sandy loam:	
Level phases (Dg)	I.
Undulating phases (Dh)	IIe.
Dundee silt loam:	
Level phase (Dk)	I.
Undulating phase (Dl)	IIe.
Dundee silty clay loam:	
Level phase (Dm)	IIIs.
Undulating phase (Dn)	IIIe.
Dundee very fine sandy loam, level phase (Do)	I.
Forestdale silt loam:	
Level phase (Fa)	IIIs.
Undulating phase (Fb)	IIIe.
Forestdale silty clay loam-clay:	
Level phases (Fc)	IIIs.
Undulating phases (Fd)	IIIe.
Mhoon and Sharkey soils (Ma)	IIIs.
Mhoon silt loam (Mb)	IIIs.
Riverwash (Ra)	VIIIs.
Robinsonville silt loam and very fine sandy loam (Rb)	I.
Sand banks, sloping (Sa)	VIe.
Sharkey-Alligator clays, level phases (Sb)	IIIs.
Sharkey and Dowling clays (Sc)	IVw.
Sharkey clay, undulating phase (Sd)	IIIe.
Sharkey silty clay loam:	
Level overwash phase (Sf)	IIIs.
Undulating overwash phase (Sg)	IIIe.
Souva silt loam:	
Gently sloping phase (Sh)	IIIs.
Level phase (Sk)	IIW.
Tunica and Dundee soils:	
Level phases (Ta)	IIIs.
Undulating phases (Tb)	IIIe.
Tunica clay and silty clay:	
Level phases (Tc)	IIIs.
Undulating phases (Td)	IIIe.
Tunica, Commerce, and Sharkey soils (Te)	IIIs.

GENESIS, MORPHOLOGY, AND CLASSIFICATION OF SOILS

By Roy W. Simonson, Director, Soil Classification and Correlation

FACTORS OF SOIL FORMATION

Soil is a function of climate, living organisms, parent materials, topography, and time. The nature of the soil at any point on the earth depends upon the combination of the five major factors at that point. All five of these factors come into play in the genesis of every soil. The relative importance of each differs from place to place; sometimes one is more important and sometimes another. In extreme cases one factor may dominate the formation of the soil and fix most of its properties, as is common when the parent material consists of pure quartz sand. Little can happen to quartz sand, and the soils derived from it usually have faint horizons. Even in quartz sand, however, distinct profiles can be formed under certain types of vegetation where the topography is low and flat and a high water table is present. Thus, for every soil the past combination of the five major factors is of the first importance to its present character.

Climate.—The climate of Tunica County is of the humid, warm-temperate, continental type characteristic of the southeastern United States. The average temperatures and rainfall distribution by months are indicated in table 1. Over the county climate has been a uniform factor in soil development but has made only a slight impression on the soils.

As a rule regions with humid warm-temperate climates have strongly weathered, leached, acid soils of low fertility. The flood plain of the Mississippi River, however, is geologically young. Time has not yet permitted strong weathering of the sediments in place. The sediments themselves have come in large part from sections of the country where weathering is not intense. Thus, the kinds of soils normally associated with warm-temperate, humid climates do not occur in Tunica County, though they are present within short distances to the east and west. The soils resemble those commonly found in cooler and slightly drier climates.

Living organisms.—Before settlement of the county, the native vegetation was most important in the complex of living organisms that affect soil development. The activities of animals were seemingly of minor importance. The first settlers found a cover of dense forests broken by occasional canebrakes. Heavy stands of cypress filled the swampy areas, whereas hardwood stands occupied most of the better drained soils and many of the wet ones. Trees on the slight ridges were chiefly hickory, pecan, post oak, blackgum, and winged elm. In the swales and low places that were wet but not swampy, the principal trees were tupelo gum, sweetgum, soft elm, green ash, hackberry, cottonwood, overcup oak, and willow oak. Canebrakes covered many of the broader flats between the swamps in the sloughs and bayous. These differences in native vegetation seem to have been associated mainly with variations in drainage. Only the major differences in the original vegetation are reflected to any extent in the soils, probably because of the general youth of the land surface.

With the development of agriculture in Tunica County, man has become important to the future direction and rate of development of the soils. The clearing of the forest, the cultivation of the soils, the introduction of new species of plants, the building of levees for flood protection, and the artificial improvement of natural drainage will be reflected in the direction and rates of soil genesis in the future. Few results of these changes can as yet be seen. Some probably will not be evident for many centuries. The complex of living organisms affecting soil genesis in Tunica County has been drastically changed, however, as a result of man's activity.

Parent materials.—Alluvial sediments laid down by the Mississippi River are the chief parent materials of soils in the county. Small quantities of alluvial sediments along the eastern edge were brought down by the Coldwater River from the uplands to the east. Here and there along this margin are some slope-wash deposits moved down from the loess-capped bluffs marking the edge of the uplands. Total acreages of sediments other than those deposited by the Mississippi River are very small. Total thickness of alluvium in Tunica County ranges from many tens to several hundreds of feet.

The alluvium in Tunica County has a mixed lithology, originating as it does in the wide reaches of the upper Mississippi River basin. Sedimentary rocks are most extensive in this upper basin, which extends from Montana to Pennsylvania, but other kinds of rocks are also exposed and serve as sediment sources in many places. Immense areas in the upper basin are mantled by recent glacial drift and loess. The alluvium along the lower stretches of the Mississippi, including Tunica County, has come from the multitude of soils, rocks, and unconsolidated sediments of some 20 States. As a result, the alluvium consists of a mixture of minerals. Furthermore, many of the minerals are comparatively fresh and but slightly weathered.

Within Tunica County, there are wide ranges in the texture of the alluvium because of differences in deposition. All of it has been laid down by river water either when quiet or in flood. As the river overflows its channel, and the water spreads out over the flood plain, the coarser sediments are dropped first. Sands are commonly deposited in bands parallel to and near the channel. Low ridges thus formed are known as natural levees. As the floodwaters continue to spread, they move more slowly and finer sediments, such as silts, are deposited next, usually mixed with some sands and clays. When the flood has passed and water is left standing in the lowest parts of the flood plain, the finest sediments or clays may settle out. These so-called slack-water clays do not settle until the water becomes still.

The simple pattern of coarse sediments near the channel, fine sediments in slack-water areas some distance away, and medium-textured sediments between the two, is not common at the present time along the Mississippi. Over the centuries the river channel has migrated back and forth across much of the flood plain, sometimes cutting out natural levees laid down earlier, sometimes depositing sand on top of slack-water clays, or vice versa. The normal pattern of sediment distribution from a single channel has been partly or wholly truncated in many places and has had subsequent beds of alluvium superimposed on it. All possible combinations of sediments resulting from the superposition of the simple patterns, one upon another, now exist in the

flood plain. Fragments of former channels with their adjacent sandy natural levees, the very gently sloping bodies of medium-textured sediments, and slack-water clays can be found in a number of places. On the whole, the large areas of slack-water clays have been stable, partly because they lie farthest from the meander belt established by the river channel in the central part of the broad flood plain.

Texture differences in the alluvium are accompanied by some differences in chemical and mineralogical composition. Sandier sediments are usually higher in quartz than those of intermediate or fine textures. Conversely, they are lower in feldspars and ferromagnesian minerals. Sandier sediments are characteristically more siliceous and lower in bases. They are also lower in carbonates for the most part, but that is not always true. Some of the more recently deposited sandier levees are distinctly calcareous, whereas many of the slack-water sediments are free of carbonates and are slightly acid.

Topography.—Tunica County is a small part of an immense flood plain that is nearly level. The topography ranges from the flat bodies of slack-water clays to very gently undulating successions of ridges and swales in areas that once bordered the river channel. Local differences in elevation are commonly measurable in feet. Seldom are there differences as great as 15 feet within 1 square mile. In some of the lowest and most nearly level flat parts of the flood plain, the maximum differences in elevation are less than 5 feet in as many square miles. Slopes are generally less than 3 percent in gradient. Greater slopes occur on a few streambanks and on the present natural levees of the Mississippi River; these may range up to 15 percent. The total area of strong slopes in the county is negligible.

The highest point in the county lies in the northwestern corner near the Mississippi River and is 205 feet above sea level. The low point in the county, near the southeastern corner at the greatest distance from the channel, is 165 feet above sea level, only 40 feet below the highest point. Because of the higher elevations near the Mississippi channel, natural drainage is east and southeast to the Coldwater River for nearly the whole county.

The flatness of the county contributes to the slow drainage of many of the soils. Water moves into the main channels with difficulty, especially from the areas of slack-water clays. Movement of water through such soils is also slow, and drainage problems are therefore increased. A much larger part of the county would probably have been wet and swampy if in the past the Mississippi River channel had not meandered so much across the flood plain.

Time.—Geologically, soils of the county are young. Even now some areas receive fresh sediments at frequent intervals. Most of the county was receiving occasional deposits until the levee was built in 1859 (5). It seems probable that the sediments now forming the land surface in Tunica County arrived during and after the advances of the Wisconsin glaciers, the latest of which was moving into the North Central States 11,000 years ago (1). The soils being formed on glacial drift of the Mankato stage (last of the Wisconsin glaciers) in those States show little horizonation other than the downward leaching of carbonates and the accumulation of organic matter in the surface layer. The present surface of the Mankato drift has probably been exposed for 8,000 years. Assuming that rates of horizon differentiation in the

alluvium of Tunica County would be as rapid as that on the Mankato drift, the soils could be somewhat older than those of south-central Minnesota. Even so, the comparison indicates that the time span for the development of horizons in the soils of Tunica County has been short.

MORPHOLOGY AND COMPOSITION

Soil morphology in Tunica County is expressed generally in faint horizons. Some of the soils do have one distinct or prominent horizon but they are in the minority. None of the soils have prominent horizons within the solum. Marked differences in texture of the solum or C horizon and an underlying D horizon occur in some profiles, as, for example, in the Tunica soils formed from thin beds of clay over sand. Generally speaking, horizon differentiation in the early stages is or has scarcely started, and the horizons themselves are indistinct.

The differentiation of horizons in soils of the county is the result of one or more of the following processes: (1) Accumulation of organic matter, (2) leaching of carbonates and salts more soluble than calcium carbonate, (3) translocation of silicate clay minerals, and (4) reduction and transfer of iron. In most soil profiles in the county, two or more of these processes have operated in the development of horizons. For example, the first two are reflected in the feeble horizons of Crevasse sandy loam, whereas the first and last are the chief causes of the morphology of Sharkey clay. All four processes have operated to some extent in the differentiation of horizons in Dundee soils.

Some organic matter has accumulated in the uppermost layer of all but a few soils in Tunica County to form an A_1 horizon. Much of that organic matter is in the form of humus. The quantities are very small in some soils but fairly large in others. Soils such as Clack loamy sand have faint and thin A_1 horizons low in organic matter at best. Some areas of the soil lack any A_1 horizon. Other soils, such as Sharkey clay, have evident thick A_1 horizons fairly high in organic matter. Taking the soils of the county as a whole, the accumulation of organic matter has been most important among processes of horizon differentiation.

Leaching of carbonates and salts has occurred in all soils of the county, although it has been of limited importance to horizon differentiation. The effects have been indirect, in that the leaching permitted the subsequent translocation of silicate clay minerals in some soils. Carbonates and salts have been carried completely out of the profiles of most of the well-drained soils. Even in the wettest soils, some leaching is indicated by the absence of carbonates and by the acid reactions. Leaching of the very wet soils is slow because water movement through the profile is itself slow. Leaching has also made little progress in removal of carbonates from soils forming on the most recent sediments near the channel of the Mississippi River. Carbonates and other salts have been washed out of the profiles of most soils in Tunica County.

Translocation of silicate clay minerals has contributed to the development of horizons in relatively few soils in the county, mainly the Dubbs, Dundee, and Bosket series. The darker coatings on ped faces and the clay films in former root channels in the B horizon of these soils indicate some downward movement of silicate clay min-

erals from the A horizons. The actual amount of clay movement has been small, but it has contributed to horizon differentiation. In the Dubbs, Dundee, and Bosket soils, translocation of clay has been about as important as the accumulation of organic matter in horizon differentiation. Leaching of carbonates and salts from the upper profile seems to be a necessary prelude to the movement of the silicate clays.

The reduction and transfer of iron has occurred in all of the very poorly drained, poorly drained, and somewhat poorly drained soils. It has also occurred to some extent in deeper horizons of moderately well drained soils, such as Dundee very fine sandy loam. In the large areas of naturally wet soils in Tunica County, the reduction and transfer of iron, a process often called gleying, has been of importance in horizon differentiation.

The gray colors of the deeper horizons of the wet soils indicate the reduction of iron oxides. This reduction is commonly accompanied by some transfer of the iron, which may be local or general in character. After it has been reduced, iron may be removed completely from some horizons and may even go out of the soil profile. More commonly in Tunica County, it has moved a short distance and stopped either in the horizon of its origin or in a nearby horizon. Iron has been segregated within deeper horizons of many of the soils to form yellowish-red, strong-brown, or yellowish-brown mottles. It has also been segregated into concretions in deeper profiles of some soils.

The differentiation of the A₁ horizon from the deeper horizons in poorly drained soils of Tunica County is caused in part by the reduction and transfer of iron. Horizon differences also result in part from a greater accumulation of organic matter in the surface layer. The effects of gleying—the reduction and transfer of iron—are evident but not prominent in the profiles of the soils in Tunica County generally. This seems to reflect the youth of the land surface and of the soils. The time during which the sediments have been subject to horizon differentiation has not been long enough to permit the development of prominent horizons in the soil profiles.

The comparative effects of the several processes in horizon differentiation can be illustrated by detailed profile descriptions. Representative soil profiles from Tunica County are therefore described in subsequent paragraphs. Some field descriptions are supplemented by laboratory analyses. One or more profile descriptions are given for Sharkey clay; Dubbs silt loam, level phase; Dubbs very fine sandy loam, level phase; Robinsonville very fine sandy loam; and Mhoon silt loam. The location of each profile is given by land description (section, township, range), by the site, or by reference to a geographic landmark. Profiles that were sampled for laboratory analyses are numbered for identification in the tables of data. The classification of these soils into great soil groups and orders is discussed in the section that follows the descriptions and laboratory data.

Sharkey clay.—Easily the most extensive soil type in Tunica County, Sharkey clay represents a group formed entirely or very largely from slack-water sediments. This group comprises approximately half of the land area of the county. Three profiles of Sharkey clay were

described and sampled in different localities, and their descriptions are as follows:

Profile No. 1—Sharkey clay (D45 Mi 014—1 to 8) NE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 2, T. 7 S., R. 12 W.:

- A_{1p} 0 to 5 inches, very dark gray (5Y 3/1 to 10 YR 3/1) clay with moderate medium granular structure; hard when dry, friable when moist, plastic when wet; (furrow slice); abrupt boundary.
- A₁₂ 5 to 10 inches, very dark gray (5Y 3/1) clay, a trifle lighter in color when crushed; a few fine faint brownish-yellow (10YR 6/6) mottles; weak medium granular structure; very hard when dry and very firm when moist; gradual boundary.
- A₁₃ 10 to 16 inches, very dark gray (5Y 3/1) clay, a trifle lighter in color when crushed; a few fine faint brownish-yellow (10YR 6/6) mottles; weak medium granular structure; very hard when dry and very firm when moist; irregular gradual boundary.
- C₁₄ 16 to 28 inches, mottled light brownish-gray (2.5Y 6/2), light olive-gray (5Y 6/2), brownish-yellow (10YR 6/8), and strong-brown (7.5YR 5/8) clay; mottles are yellowish brown (10YR 6/4); massive; very hard when dry, very firm when moist, very plastic and very sticky when wet; cores of olive-gray clay 5 to 15 mm. in diameter extend down from A₁₃; gradual boundary.
- C₄ 28 to 34 inches, mottled grayish-brown (2.5Y 5/2), light olive-brown (2.5Y 5/4) and yellow (10YR 7/6) clay; mottles are fine, faint, many; massive; very hard when dry, firm when moist, very plastic and very sticky when wet; few very fine pores; gradual boundary.
- D₄ 34 to 55 inches +, mottled dark olive-gray (5Y 3/2), olive (5Y 4/3), dark grayish-brown (2.5Y 4/2), and brown (7.5 YR 5/4) clay; mottles are fine, faint, many; massive to very weak fine and medium granular structure; very hard to extremely hard when dry, very firm when moist, very plastic and very sticky when wet.

Profile No. 2—Sharkey clay (D45 Mi 017—1 to 6) SE $\frac{1}{4}$ SE $\frac{1}{4}$ sec. 33, T. 4 S., R. 11 W.:

- A_{1p} 0 to 4 inches, very dark gray (10 YR 3/1) clay with moderate fine granular structure; hard when dry, friable when moist, very plastic and sticky when wet; abrupt boundary.
- A₁₄ 4 to 13 inches, very dark gray (5Y 3/1) clay mottled with brown (7.5YR 4/4); mottles are fine, distinct, many; massive with slight indication of very fine irregular blocky structure in lower part; extremely hard when dry, extremely firm when moist, very plastic and very sticky when wet; black flecks in upper part and few spherical pockets (20 to 30 mm.) of darker soil material in lower part; gradual boundary.
- AC₄ 13 to 17 inches, mottled very dark gray (5Y 3/1), olive (5Y 5/4), and strong-brown (7.5YR 5/6) clay; mottles are fine, distinct, many; massive with slight suggestion of weak medium irregular blocky structure; extremely hard when dry, extremely firm when moist, very plastic and very sticky when wet; largely interpenetrating cores and masses from horizons above and below.
- C₁₄ 17 to 24 inches, mottled light-gray (5Y 6/1), brownish-yellow (10YR 6/8), and reddish-yellow (7.5YR 6/8) clay; mottles are fine, distinct to prominent, many; crushed soil is olive brown (2.5Y 4/4); massive; extremely hard when dry, extremely firm when moist, very plastic and very sticky when wet; few dark cores extend into layer from above; gradual boundary.
- C₂₄ 24 to 42 inches +, mottled dark-gray (5Y 4/1) and olive-brown (2.5Y 4/4) clay; mottles are fine, faint, many; massive; extremely firm when dry, very plastic and very sticky when wet.

Profile No. 3—Sharkey clay (D45 Mi 018—1 to 4) NW $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 2, T. 5 S., R. 11 W.:

- A_{1p} 0 to 4 inches, very dark gray (10YR 3/1) clay with moderate fine to medium granular structure; hard when dry, friable when moist, very plastic and sticky when wet (furrow slice); abrupt boundary.
- A_{1s} 4 to 13 inches, very dark gray (5Y 3/1) clay mottled with yellowish brown (10YR 5/6) and yellowish red (5YR 4/6); mottles are mostly yellowish brown, are fine and medium, distinct to faint, many; massive with suggestion of weak coarse irregular blocky structure; very hard when dry, extremely firm when moist, very plastic and very sticky when wet; gradual boundary.
- C_{1s} 13 to 23 inches, mottled olive-gray (5Y 5/2), brownish-yellow (10YR 6/8), and strong-brown (7.5Y 5/8) clay; mottles are fine and medium, distinct, many; massive; extremely hard when dry, extremely firm when moist, very plastic and very sticky when wet; few dark cores (10 to 30 mm. in diameter) extend down into this horizon from above; gradual boundary.
- C_{2s} 23 to 36 inches +, mottled gray (5Y 5/1) and strong-brown (7.5YR 5/8) clay; mottles are fine, prominent to distinct, many; layer appears speckled in place; massive; extremely hard when dry, extremely firm when moist, very plastic and very sticky when wet; few worm channels and dark cores reach into this horizon.

The chief horizon distinctions in the three profiles of Sharkey clay are in color—mainly differences in hue and in degree of mottling. There are a few slight differences in texture, structure, and consistence, but these occur erratically in the profiles. The A₁ horizons in all three profiles reflect past accumulation of organic matter, and the deeper horizons have been affected by gleying, the reduction and transfer of iron. Evidence for gleying lies in the 5Y hue (Munsell system) and in the mottled color patterns. Common ranges in thickness of horizons, as well as those in drainage, are indicated by the three profiles. A further measure of the low degree of horizon differentiation of Sharkey clay is given by the laboratory data in table 5.

As shown by the laboratory data, the content of organic matter decreases with depth, but no other consistent trends or appreciable differences are evident in the profiles. All three profiles are high in clay and low in sand, have high cation exchange capacities, and have high values for exchangeable calcium, magnesium, and potassium. They are low in exchangeable hydrogen as compared to exchangeable bases; percentage base saturation is high. The high exchange capacities are consistent with the identification of montmorillonite as a dominant clay mineral in Sharkey clay. The analytical data for the three profiles, as a whole, emphasize further the low degree of horizon differentiation.

Lack of distinct horizons in Sharkey clay is a reflection of the youth of the soils, the resistance of fine sediments to change, and some mixing of materials within the profile. The youth of the land surface and of the sediments in Tunica County has been discussed earlier. The fine texture of soils such as Sharkey clay acts as an effective brake on processes of horizon differentiation. Movements of constituents

TABLE 5.—Particle size distribution, organic matter, exchangeable cations, base saturation, and pH by horizons for Sharkey clay

[Analysis by Soil Survey Laboratory, Soil Conservation Service, Beltsville, Md.]

Profile and laboratory number	Horizon	Depth Inches	Mechanical separates					Organic matter %	Exchangeable cations ¹				Sum of cations	Base saturation	pH
			Very coarse sand, coarse sand, and medium sand %	Fine sand	Very fine sand	Silt	Clay		H	Ca	Mg	K			
			Per cent	Per cent	Per cent	Per cent	Per cent	Per cent							Per cent
Profile No. 1—(D45 Mi 014—1 to 8):															
46244-----	A _{1p}	0-5	1.7	1.3	1.7	38.2	57.1	3.7	9.7	25.0	7.9	1.1	43.7	78	5.6
46245-----	A ₁₂	5-10	1.0	1.3	1.8	34.1	61.8	2.8	10.3	23.8	8.0	.8	42.9	76	5.2
46246-----	A ₁₃	10-16	1.2	1.6	2.2	37.5	57.5	2.5	13.9	19.1	7.5	.6	41.1	66	5.0
46247-----	C ₁₂	16-28	.4	.5	1.6	35.6	61.9	.9	11.7	20.0	9.7	.7	42.1	72	4.6
46248-----	C ₁₂	28-34	.7	.9	2.9	37.1	58.8	.9	10.7	21.6	10.5	.7	43.5	75	4.8
46249-----	D ₂	34-42	.7	.9	4.3	33.2	60.9	.7	9.4	21.8	10.5	.7	42.4	78	4.9
46250-----	D ₂	42-49	.8	1.0	4.1	39.2	54.9	.9	6.4	21.7	10.1	.6	38.8	84	5.3
46251-----	D ₂	49-55	.9	.7	2.4	43.9	52.1	.6	3.7	23.3	10.5	.5	38.0	90	6.1
Profile No. 2—(D45 Mi 017—1 to 6):															
46264-----	A _{1p}	0-4	1.3	1.5	2.5	34.4	60.3	2.5	7.6	25.9	9.2	1.1	43.8	83	5.9
46265-----	A ₁₂	4-8	1.1	1.0	1.5	31.8	64.6	2.2	7.1	28.0	9.8	.7	45.6	84	5.9
46266-----	A ₁₂	8-13	1.3	1.2	1.9	33.0	62.6	2.3	6.4	27.3	10.2	.6	44.5	86	5.9
42267-----	AC ₂	13-17	2.7	1.7	1.8	35.0	58.8	1.6	7.7	25.6	10.2	.6	44.1	83	5.9
46268-----	C ₁₂	17-24	.3	.7	1.9	31.8	65.3	1.2	7.3	24.7	11.8	.6	44.4	84	5.6

	4	6	1.6	35.6	61.8	1.2	7.3	23.3	11.9	.7	43.2	83	5.5
C ₂₂	24-42												
46269-----													
Profile No. 3--(D45													
Mi 018-1 to 4):													
46270-----													
A ₁₀	0-4	1.1	.9	7	32.1	65.2	2.4	26.9	9.4	1.0	44.1	85	5.9
46271-----													
A ₁₂	4-13	1.3	.8	.4	32.5	65.0	1.8	27.1	8.9	.7	42.1	87	6.2
46272-----													
C ₁₂	13-23	1.1	1.0	.6	37.4	59.9	1.1	26.9	9.6	.6	44.9	83	5.6
46273-----													
C ₂₂	23-36	.6	.7	.4	39.4	58.9	.5	19.6	11.3	.7	39.8	79	5.0

³ The contents of organic matter were estimated by the hydrogen peroxide method (8).

¹ Chemical data obtained by Fidelia Davol, Soil Survey Laboratory, Soil Conservation Service, Beltsville, Md.

² Very coarse sand, coarse sand, and medium sand are combined here because of the very small amounts of each.

from one horizon to another are naturally slow in profiles with many very fine pores and few large ones. Rates of hydrolysis and breakdown of primary minerals are reduced because of the slow removal of the end products of those processes.

Mixing of materials from the present horizons is a further factor offsetting horizon differentiation in Sharkey clay. Because of the montmorillonitic nature of the clay, the soil shrinks greatly when it becomes dry. Cracks that are from 1 to 4 inches wide form at the surface. These cracks extend downward for 2 or 3 feet, becoming narrower with depth. When the soil becomes wet again, it swells so that the cracks close; but seldom does that happen before some material from the A₁ horizon drops down into the cracks and becomes mixed with the C or D horizon. The shrinking and swelling seem to be less than in the Grumusols (7) or the Regur soils of India (10), but the process is operating to some extent, the degree of which is as yet unknown. The mixing or churning of the soil seems to have partly offset horizon differentiation.

Dubbs soils.—The well-drained soils formed on the older natural levees may be represented by the Dubbs series, which has slightly more distinct horizons than Sharkey clay. Closely related to the Dubbs soils in profile characteristics and in processes of formation are the Bosket and Dundee series. Collectively, the three series occupy slightly less than one-fifth of the total area of Tunica County, but they are some of its most productive soils. Two profiles of Dubbs silt loam, level phase, and one of Dubbs very fine sandy loam, level phase, were described and sampled at different places in the county. The descriptions of the three profiles are as follows:

Profile No. 4—Dubbs silt loam (D44 Mi 001—1 to 7) NW¼ sec. 6, T. 6 S., R. 11 W.:

- A_p 0 to 4 inches, dark grayish-brown to dark yellowish-brown silt loam with moderate medium granular structure; very friable (furrow slice); abrupt boundary.
- B₂₁ 4 to 9 inches, variegated dark yellowish-brown and dark-brown silty clay loam with strong fine subangular blocky structure; friable; crushed mass is yellowish brown; gradual boundary.
- B₂₂ 9 to 20 inches, variegated dark yellowish-brown to yellowish-brown silt loam with moderate medium and coarse subangular blocky structure, lighter in color when crushed; friable, slightly plastic; few very fine and dark-brown concretions and yellowish-red specks inside peds; pinholes common; texture becomes coarser with increasing depth; gradual boundary.
- B₃ 20 to 30 inches, yellowish-brown very fine sandy loam with weak coarse irregular blocky structure; some ped faces have dark yellowish-brown coatings; pinholes common; few very dark brown streaks, which are former root channels; very friable, nonplastic; gradual boundary.
- C₁ 30 to 36 inches, yellowish-brown very fine sandy loam to loamy very fine sand; structureless; soft, very friable, nonplastic; distinct boundary.
- C₂ 36 to 48 inches, light yellowish-brown very fine sandy loam; structureless; soft, very friable, nonplastic; distinct boundary.
- D 48 to 56 inches +, light yellowish-brown loamy fine sand with fine light-gray and reddish-yellow flecks; structureless; loose, nonplastic.

Profile No. 5—Dubbs silt loam (D44 Mi 004—1 to 6) SE $\frac{1}{4}$ NE $\frac{1}{4}$ sec. 13, T. 6 S., R. 12 W.:

- A_p 0 to 5 inches, grayish-brown to dark yellowish-brown silt loam with moderate fine granular structure; very friable (furrow slice); abrupt boundary.
- B₂₁ 5 to 11 inches, dark yellowish-brown clay loam with strong medium subangular blocky structure, which crushes readily to mixture of moderate fine subangular blocks and moderate medium granules; hard when dry, friable when moist, slightly plastic when wet; few pinholes; crushed mass is yellowish brown; gradual boundary.
- B₂₂ 11 to 14 inches, yellowish-brown heavy loam with weak to moderate coarse irregular blocky structure; peds have partial coatings of dark yellowish brown, and interiors have network of pinholes with very dark brown linings; hard when dry, friable when moist, slightly plastic when wet.
- B₃ 14 to 21 inches, light yellowish-brown very fine sandy loam mottled with reddish yellow; mottles are fine, faint, many; weak coarse irregular blocky structure; pinholes and very dark brown streaks common; gradual boundary.
- C_{1k} 21 to 33 inches, mottled pale-yellow and reddish-yellow very fine sandy loam; mottles are fine, faint, many; crushed mass appears light yellowish brown; structureless; soft, very friable; pinholes few to common; black and very dark brown very fine soft concretions common (2 per square inch); gradual boundary.
- C_{2k} 33 to 60 inches +, mottled pale-yellow, reddish-yellow, and light-gray very fine sandy loam; mottles are fine, faint, and distinct, many; structureless; soft, very friable; few black and very dark brown very fine concretions.

Profile No. 6—Dubbs very fine sandy loam (D44 Mi 003—1 to 6) NE $\frac{1}{4}$ NW $\frac{1}{4}$ sec. 17, T. 6 S., R. 11 W.:

- A_p 0 to 5 inches, variegated dark yellowish-brown and dark grayish-brown very fine sandy loam with weak fine granular structure; very friable; abrupt boundary; this is furrow slice.
- B₂₁ 5 to 12 inches, variegated very dark brown and dark grayish-brown clay loam with strong fine and medium subangular blocky structure; lighter in color when crushed; hard when dry, firm when moist, slightly plastic when wet; pinholes common; gradual boundary.
- B₂₂ 12 to 19 inches, variegated yellowish-brown, dark yellowish-brown, and very dark brown silty clay loam with strong coarse subangular blocky structure; peds have very dark brown coatings and yellowish-brown to dark yellowish-brown interiors marked by network of pinholes with very dark brown linings; very hard when dry, firm when moist, slightly plastic when wet; gradual boundary.
- B₃ 19 to 26 inches, yellowish-brown very fine sandy loam with weak coarse irregular blocky structure; peds have partial dark-brown coatings, which fade in lower part; slightly hard, very friable, nonplastic; gradual boundary.
- C 26 to 36 inches, yellowish-brown loamy very fine sand with few dark-brown streaks; structureless; slightly hard, very friable, nonplastic; gradual boundary.
- D 36 to 60 inches +, light yellowish-brown very fine sand; structureless, loose.

Horizons in the Dubbs profile are set apart by differences in one or more of these properties: Color, texture, structure, and consistence. For example, the A horizon is darker than the B or C horizon but not much darker than the upper B horizon. The B horizon has finer texture, less friable consistence, and more distinct structure than the others. Clay films are also present on some ped faces and in pores

of the B₂ horizon but are absent from the others. Even with differences in more than one property, however, the horizons are not yet distinct, except for the D horizons in profiles No. 4 and No. 6. The markedly different D horizons in those profiles reflect stratification of the alluvium rather than horizon development.

Some indication of normal ranges in horizon thickness, texture, structure, consistence, and the like is provided by the three profile descriptions. The thickness of solum, the combined A and B horizons, ranges from about 20 to 30 inches. Texture ranges from very fine sandy loam to silt loam in the A horizon and from clay loam to silty clay loam in the B horizon. The first and last of the three profiles are well drained, whereas slight restriction of drainage in the C horizon is evident in profile No. 5. In its natural drainage, this profile is marginal to the Dundee soils, although it lies within the permissible range of the Dubbs series.

Analytical data for the three Dubbs profiles are given in table 6. These data provide further characterization of the soils and are consistent with the morphological features described in the field.

Few horizon differences are indicated by the laboratory data. The A horizon is higher in organic matter than the B and C horizons, although the distinction between it and the upper B horizon is very slight. It seems certain that the original content of organic matter in the A horizon, especially in the upper part, has been lowered by cultivation of the soils. The B₂ horizon is sharply higher in clay than are the A and C horizons. This difference may be caused in part by stratification.

The relative proportions of fine sand, very fine sand, and silt change from one horizon to another in the profiles. The shifts in relative amounts of the three size fractions suggest stratification of the sediments that now comprise the soil profile. Present distribution of clay in the profiles may therefore be more the result of original differences than of horizon differentiation. Despite that probability, the presence of clay films on ped faces and in pores of the B₂ horizon demonstrate some movement of silicate clay minerals downward from the A horizon. Base status is high throughout the profiles, and calcium is dominant among the exchangeable cations. This is further evidence of limited weathering and is consistent with the low degree of horizon differentiation.

Lack of distinct horizons in the Dubbs soils seems largely caused by their youth. Carbonates and salts have been completely removed from the solum, and leaching has also replaced some of the exchangeable bases with hydrogen. Organic matter has accumulated in the upper horizons, doubtless originally in larger amounts than are now present. Some translocation of silicate clay minerals has taken place, but this process is in very early stages. As time passes, the differentiation of horizons may be expected to continue.

Robinsonville very fine sandy loam.—Accumulation of organic matter in the upper profile has been the sole cause of the very slight horizonation in some soils of Tunica County. These soils are in the first stages of formation from recent sediments. The total extent of

these soils, which may be represented by Robinsonville very fine sandy loam, is about the same as that of the Dubbs, Bosket, and Dundee series. A profile description of Robinsonville very fine sandy loam is as follows:

Profile No. 7 Robinsonville very fine sandy loam, near Mhoon Landing:

- A 0 to 8 inches, grayish-brown (10YR 5/2) very fine sandy loam with weak fine granular structure; soft, very friable; neutral; gradual boundary.
- AC 8 to 32 inches, yellowish-brown (10YR 5/4) fine sandy loam with weak fine granular structure to structureless; soft, very friable; neutral to mildly alkaline; gradual boundary.
- C 32 to 40 inches +, light yellowish-brown (10YR 6/4) to yellowish-brown (10YR 5/4) loamy fine sand; structureless; loose to very friable; mildly alkaline.

A question may be raised about the recognition of horizons in Robinsonville profiles, especially when the full range of the series is considered. In the profile described above, the surface layer is darker in color and seems higher in organic matter than the deeper layers. Hence, it is identified as an A horizon. This horizon seems to be in the earliest stages of differentiation and may be considered incipient.

Within the range of the Robinsonville series are other profiles that lack darkened surface layers and are essentially uniform in color throughout. These profiles may be considered as having no more than a C horizon. They comprise materials from which soils are being formed. Some carbonates and salts have been leached from these profiles, but some also remain. Robinsonville very fine sandy loam represents a group of well-drained soils in which horizon differentiation is just beginning.

Mhoon silt loam.—Some of the soils in the first stages of horizon development are wet at least part of the time. Their morphology reflects this wetness, although the degree of horizon differentiation parallels that of Robinsonville very fine sandy loam. These wet soils can be represented by Mhoon silt loam, a profile description of which follows:

Profile No. 8—Mhoon silt loam, near Mhoon Landing:

- A_p 0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam with weak fine granular structure; slightly hard, very friable; neutral to mildly alkaline; clear boundary.
- AC 6 to 15 inches, brown (10YR 4/2) silt loam with few fine faint mottles of grayish brown and yellowish brown; weak fine granular structure to structureless; slightly hard, friable; neutral to mildly alkaline.
- A_b 15 to 26 inches, dark grayish-brown (10YR 4/2) silt loam with few fine faint mottles of yellowish brown and gray; weak fine granular structure; slightly hard, very friable; neutral to mildly alkaline.
- C_{be} 26 to 40 inches +, mottled gray (5YR 6/1), yellowish-brown (10YR 5/4), and yellow (10YR 7/2) silty clay loam; mottles are fine and medium, distinct and many in the gray matrix; massive; hard, firm; neutral to mildly alkaline.

This one profile of Mhoon silt loam appears to consist of a thin recent deposit and part of a former soil. The present cycle of horizon differentiation seems to be operating partly in the thin mantle and partly in the buried soil. The surface horizon (A_b) of the buried soil is now functioning as the C horizon for the modern soil in process of formation.

Profile No. 6— Dubbs very fine sandy loam, level phase, (D44 Mi 001—1 to 6):	A _p	0-5	.3	.2	3.5	33.5	46.2	16.3	1.7	5.2	7.2	1.6	.60	14.6	64	5.4
D4367-----	B ₂₁	5-12	.1	.1	1.2	25.2	38.2	35.2	1.6	11.6	9.2	2.3	.43	23.5	51	4.6
D4368-----	B ₂₂	12-19	.0	.0	1.6	46.7	25.3	26.4	1.3	10.7	8.4	2.5	.33	21.9	51	4.8
D4369-----	B ₃	19-26	.1	.1	2.7	65.3	15.0	16.8	.7	6.7	6.1	2.0	.28	15.1	56	4.9
D4370-----	C	26-36	.0	.0	13.7	70.2	8.7	7.4	.2	2.9	3.9	1.2	.21	8.2	65	5.2
D4371-----	D	36-60	.0	.0	42.2	49.9	5.2	2.7	.0	1.6	3.1	.8	.21	5.7	72	5.8
D4372-----																

¹ Chemical data obtained by Fidelia Davol, Soil Survey Laboratory, Soil Conservation Service, Beltsville, Md.

² Very coarse sand and coarse sand are combined here because of the very small amounts of each.

³ The contents of organic matter were estimated by the hydrogen peroxide method (8).

In the profile of Mhoon silt loam, as in that of Robinsonville very fine sandy loam, horizon differentiation is in the very early stages. Organic matter has accumulated in the surface layer to form an incipient A horizon. In this respect the two soils are alike. Because of the wetness of the Mhoon soils, some reduction has also occurred in the profile, as evidenced by the mottling. It is possible that the mottling in the A_b and C_{bg} horizons may have developed before deposition of the 15-inch surface layer, but processes responsible for mottling seem to be operating now.

Because the soil is in the early stages of formation, a question may be raised about need for recognition of horizons in the profile of Mhoon silt loam. The A_1 horizon is incipient in character, and the leaching of carbonates and salts has not progressed far. Mottled patterns of colors can be developed in soils within a few years. It is clear that horizon differentiation in the Mhoon silt loam, as in Robinsonville very fine sandy loam, has made little progress. The horizons barely qualify for recognition and are very faint at best.

CLASSIFICATION OF SOILS BY HIGHER CATEGORIES

Soils are placed into narrow classes for the organization and application of knowledge about their behavior within farms or counties. They are placed into broad classes for study and comparisons of large areas such as continents. In the comprehensive system of soil classification followed in the United States (2), the soils are placed in six categories, one above the other. Beginning at the top, the six categories are the order, suborder, great soil group, family, series, and type.

The highest category has the soils of the whole country grouped into three orders, whereas thousands of soil types are recognized in the lowest category. The suborder and family categories have never been fully developed and thus have been little used. Attention has largely been given to the classification of soils into soil types and series within counties or comparable areas and to the subsequent grouping of series into great soil groups and orders. The nature of the soil series and soil type is discussed in an earlier section on Methods Used in the Soil Survey of Tunica County. Subdivisions of soil types into phases so as to provide finer distinctions significant to soil use and management are also discussed in the same earlier section.

Classes in the highest category of the classification scheme are the zonal, intrazonal, and azonal orders (2). The zonal order comprises soils with evident, genetically related horizons that reflect the predominant influence of climate and living organisms in their formation. The intrazonal order includes soils with evident, genetically related horizons that reflect the dominant influence of a local factor of topography, parent materials, or time over the effects of climate and living organisms. The azonal order includes soils that lack distinct, genetically related horizons commonly because of youth, resistant parent material, or steep topography.

Among the soils of Tunica County, the Dubbs, Bosket, and Dundee series may be considered zonal soils. The horizons in those soils are evident but more nearly faint than distinct. They are genetically related and seem to reflect the influence of climate and living or-

ganisms, although the effect of time is also important. The three series are considered to fall barely within the zonal order and may be looked upon as intergrades to the azonal order.

The Dubbs, Dundee, and Bosket series are tentatively classified in the Gray-Brown Podzolic group, although there is evidence for placing them in the Prairie group. Gray-Brown Podzolic soils have thin dark A_1 horizons over light brownish-gray and often platy A_2 horizons. The A_2 horizons are underlain by brown to yellowish-brown finer textured B horizons that grade into lighter colored and usually coarser textured C horizons.

Prairie soils have thick dark grayish-brown to very dark brown A_1 horizons grading into brownish B horizons, which may be mottled. The B horizons grade in turn into lighter colored and usually coarser textured C horizons. Both great soil groups normally occur under humid cool-temperate climates, the former under deciduous forest (4) and the latter under tall prairie grasses.

The Dubbs, Dundee, and Bosket soils lack a distinct A_2 horizon, but all areas of the soils have been disturbed through cultivation. Consequently, it seems highly probable that the plow layer now includes former thin A_1 and A_2 horizons. The soils clearly lack thick dark A_1 horizons and do not appear to have had them in the past.

The present character of the B horizon, as exemplified by the Dubbs profile, would permit classification of the soils in either of the two great soil groups. The apparent absence of a thick A_1 horizon, as well as the probability that the A_1 and A_2 horizons have been mixed by plowing, is used as a basis for placing the soils in the Gray-Brown Podzolic group. It should be recognized, however, that the series are intergrades to the Prairie soils, being almost as much like them as they are like the central members of the Gray-Brown Podzolic group.

Soils of the intrazonal order are by far the most extensive in Tunica County. These include the Alligator, Dowling, Forestdale, and Sharkey series as well as other soils that were not classified into series during the field survey. All are either poorly drained or somewhat poorly drained. None seems to have distinct horizons although all show the effects of gleying and accumulation of organic matter in their morphology. These soils either are members of or are closely related to hydromorphic groups. The absence of a thick A_1 horizon high in organic matter is used as a basis for excluding these series from the Humic Gley group (11). The series, therefore, seem more appropriately classified as Low-Humic Gley soils (11), with the exception of Sharkey clay. Sharkey clay exhibits properties of churning through shrinking, swelling, and cracking and is therefore tentatively classified as a Grumusol (?).

Recognition of the Low-Humic Gley group was proposed initially for somewhat poorly drained to poorly drained soils lacking prominent A_1 horizons but having strongly gleyed B and C horizons with little textural differentiation. The recognition of two great soil groups, Low-Humic Gley and Humic Gley (Wiesenboden) soils, was based on thickness of the A horizon and on its content of organic matter.

Humic Gley soils were defined as high in organic matter, whereas Low-Humic Gley soils are moderate to low. The Alligator, Dowling, and Forestdale soils are not high in organic matter, and they do show effects of gleying in their morphology. Beyond that, there is less

evidence of cracking and churning in these soils than in Sharkey clay. On the basis of present knowledge, classification of the three series as Low-Humic Gley soils seems appropriate. Further studies may indicate that the Alligator and Dowling series are intergrades to Grumusols, because both are closely related to the Sharkey series.

Recognition of Grumusols was proposed (7) for a group of soils dominated by montmorillonitic clays. These soils are typically clay in texture, lack eluvial and illuvial horizons, have moderate to strong granular structure in the upper horizons, and have high coefficients of expansion and contraction upon wetting and drying. In the exchange complex of these soils, calcium and magnesium are dominant. With their high coefficients of expansion and contraction, the Grumusols shrink and swell markedly with changes in moisture content. In the process of shrinking and swelling, the soils crack, and materials from upper horizons drop down into lower ones. Thus, the soils are being churned or mixed continually, a process that partially offsets horizon differentiation.

Grumusols may have prominent A_1 horizons but lack B horizons. They have dull colors of low chroma, as a rule, and are not well drained. Sharkey clay has many of the features common to Grumusols. The profile has a clay texture throughout, and the clay is dominantly montmorillonitic. The dark A_1 horizon, plus evidence of gleying in the deeper horizons, suggests placement of the series in the Humic Gley group. Laboratory analyses, however, indicate that the content of organic matter in the A_1 horizon of Sharkey clay is appreciably lower than that normal to Humic Gley soils and more nearly comparable to that of typical Grumusols. Furthermore, the dark A_1 horizon is also common to many Grumusols. Consequently, Sharkey clay is tentatively classified as a Grumusol, but as one which is an intergrade to the Low-Humic Gley group. Sharkey clay seems more poorly drained than typical of Grumusols, but it is not too wet for operation of the churning and mixing process.

Azonal soils are less extensive in Tunica County than intrazonal soils, despite the fact that the whole area consists of geologically recent alluvium. Azonal soils are slightly more extensive in the county than zonal soils. At the same time, all soils classified in the zonal and intrazonal orders are marginal to the azonal order because of their low degree of horizonation. Only the series that lack genetically related horizons or are in the initial stages of horizon differentiation are placed in the azonal order. Although much smaller in total area, the azonal soils have a greater number of series than the intrazonal soils. The azonal order includes the Alva, Ark, Bowdre, Clack, Collins, Commerce, Crevasse, Eupora, Mhoon, Robinsonville, Souva, and Tunica series. These series are all classed as Alluvial soils, although some are poorly drained and exhibit effects of gleying.

The Mhoon and Souva soils are poorly drained. Their morphology shows that some reduction and transfer of iron has occurred. Even so, the horizons are faint at best and in some profiles all but lacking. Consequently, the two series are considered wet Alluvial soils rather than Low-Humic Gley soils. Unless drainage is greatly improved in the future, the two series can be expected to develop into Low-Humic Gley soils as horizon differentiation continues.

The Alluvial soils in Tunica County lack distinct horizons because the sediments in which they are developing are so young. Given more time under natural conditions, most of these soils would eventually have had profiles similar to those of the Dubbs, Dundee, and Bosket series. Whether that will now occur in soils under cultivation remains to be seen. The regime in which the soils now exist differs greatly from that of their original natural environment. Some of the processes important in horizon differentiation probably will be accentuated and others subdued. Some may progress more rapidly, and others more slowly. The net effect of the change in environment on future development of the soils cannot be forecast as yet with any certainty and may not be apparent for some centuries.

ADDITIONAL FACTS ABOUT TUNICA COUNTY

ORGANIZATION AND POPULATION

In 1832 the Chickasaw tribe ceded most of the present site of Tunica County to the United States (5, 9). The first history of the county is in records kept by members of the group led by DeSoto that explored the southern Mississippi Valley in 1541-42. Most authorities believe DeSoto's party first saw the Mississippi River on May 15, 1541, from a point located in what is now the northwestern part of Tunica County (9). According to the records, many Indians lived in the settlements in the area. DeSoto's group also told of finding an abundance of grain near the river.

By 1832 settlers were coming into the area from Virginia, the Carolinas, Georgia, Kentucky, and Tennessee (5). In 1836 the county was formed and named for the Tunica Indians, a small tribe that lived there (9).

In 1950, the population of the county was 21,664—a slight decrease since 1940. Most of the inhabitants live on farms. Tunica, the county seat and the only incorporated town in the county, had a population of 1,354 in 1950. Several other small towns and trade centers are located along the railroad lines.

INDUSTRIES, TRANSPORTATION, AND MARKETS

The inhabitants of Tunica County depend almost entirely upon agriculture for a livelihood. An oilmill at Tunica processes cottonseed and soybeans. Many of the 26 cotton gins in the county are privately owned and are used only by the cotton plantations owning them. The timber acreage is so small that there are few sawmills.

Two main lines of the Illinois Central Railroad cross the county—one along the eastern side of the county, and the other, the Yazoo and Mississippi Valley, near the western border. These lines make direct connection with Memphis, St. Louis, and Chicago markets to the north and with Vicksburg and New Orleans outlets to the south. Memphis, Tenn., 38 miles away, is the principal market for the county.

Federal highway No. 61 passes through the county and connects with Memphis, Tenn., and cities to the north and with Jackson, Miss., and other southern cities. There is one gravelled State highway (No. 3), and many county roads, which are gravelled or improved dirt.

The Mississippi River is no longer used extensively as a means of transportation.

WATER SUPPLY

Most water for household use and livestock is pumped from shallow wells. Several artesian, or flowing, wells are also located in the county. Of these, some are more than a thousand feet deep.

FORESTS AND WILDLIFE

Timber and soil are the two principal resources of the county. Cutover timber, much of it cypress and tupelo gum native to the swamps, covers large areas. Woodland that is not on farms usually consists of holdings in large, poorly drained areas. In addition to the cypress and tupelo gum, such areas usually have a fair grade of willow oak, post oak, water oak, and red oak, ash, elm, and sweetgum. No systematic plan has been established for timber management or protection.

The lakes and rivers are well stocked with various species of fish. Squirrels, rabbits, and other small fur-bearing animals are plentiful. Quail, ducks, geese, and other game birds are fairly common. There is some commercial fishing on the Mississippi River and on some of the larger lakes. Game and fish conservation is not organized in the county. State game laws provide the game protection.

SCHOOLS AND CHURCHES

There are two consolidated high schools and two consolidated grammar schools at Tunica, the county seat. Buses furnish transportation for children outside of Tunica who attend the consolidated schools. Fifty-eight grammar schools are located in outlying districts.

All of the churches in the county are Protestant. There were 9 churches for whites and 53 for Negroes in the county at the time of the survey (1942).

AGRICULTURE

The inhabitants of Tunica County have always depended upon agriculture for their principal means of livelihood. A total of 154,499 acres was in cropland in the county in 1949. This figure includes, besides harvested cropland, fallow or idle cropland and pastured cropland or plowable pasture. Cotton, which has long been the leading crop, has been replaced by other crops to some extent since cotton acreage was restricted in 1934.

CROPS

The acreage and yield for principal crops grown in Tunica County are given in table 7 for stated census years. As shown in this table, cotton occupies the greatest acreage, and corn, soybeans, hay crops, and oats follow in the order named.

Cotton has been the major cash crop since the beginning of agriculture in the county. After acreage was restricted in 1934, other crops and pasture replaced cotton to some extent. In 1949, cotton represented about 54 percent of the total acreage in crops. Development of better varieties and improvement in methods of manage-

ment during recent years have resulted in greatly increased yields of cotton.

Corn has always led the grain crops in acreage, but until recently not enough was grown to meet local needs. Corn yields are expected to increase as management and soil selection improve.

Oats yield extremely well on some soils to which corn is poorly suited, provided winter freezes do not injure the stand. Yields of 100 bushels or more per acre are obtained. Winter wheat and barley make excellent yields but are not grown to any great extent.

Soybeans are grown extensively. They make excellent growth on most soils of the county and have become the principal hay crop. Until recently, soybeans were not grown for oil because the yield was low. Higher yielding varieties developed recently have made soybeans for oil one of the main cash crops, especially on the heavy clay soils. It is a common practice to turn under soybeans late in summer before planting oats in the fall.

Alfalfa is not grown extensively. It makes good yields of hay if properly managed. Some of the soils are suitable for alfalfa. Others would be suitable if lime were added to correct acidity. Although limestone is available at a reasonable price, it is not used extensively.

TABLE 7.—*Acreage and average yields per acre of principal crops in Tunica County, Miss., for stated years*

Crop	1929	1939	1949
Cotton:			
Acres harvested.....	100, 818	60, 314	83, 925
Pounds lint per acre.....	201	520	389
Corn for grain:			
Acres harvested.....	9, 022	35, 442	23, 314
Bushels per acre.....	17. 8	22	22
Soybeans:			
Acres threshed.....	(¹)	2, 358	6, 493
Bushels per acre.....	(¹)	14	18
Oats:			
Acres threshed.....	(²)	3, 141	1, 867
Bushels per acre.....	(²)	40	31
Hay:			
Alfalfa:			
Acres cut.....	419	2, 126	2, 078
Tons per acre.....	2. 5	2. 3	1. 7
Lespedeza:			
Acres cut.....	(²)	1, 461	6, 269
Tons per acre.....	(²)	1. 5	1. 0
Soybeans, acreage for hay.....	(¹)	14, 473	8, 444

¹ Breakdown of acreage not available. Total acreage grown alone for all purposes—3,803; bushels threshed—755.

² None reported.

Lespedeza is a comparatively new crop in the county but it has become popular. It fits well into a rotation with oats and is frequently planted in oats early in spring. Fair yields of good-quality hay usually can be harvested from lespedeza planted in a crop of oats.

Sweetclover and red clover are not grown as crops. They make excellent volunteer growth, however, on soils that are neutral to alkaline.

LIVESTOCK

In 1950, approximately 94 percent of the work animals in the county were mules. The mules owned by small operators are frequently of inferior quality. Most of the large operators own the best available. Many mules have been replaced by tractors. The 1950 census reports 4,947 mules in the county, or 432 fewer than in 1940. In the past it was not unusual to see 50 to 75 mules in a field.

There were 296 horses and colts, including ponies, in the county in 1950, a decline of 64 head since 1940. Most of the horses are saddle stock of fair to good quality.

The number of cattle increased from 3,455 head in 1940 to 5,321 in 1950. Most of these are poor-grade dairy cattle owned by farm tenants. Practically all the herds of beef cattle have been established recently. In 1940 there were only 138 beef cattle in the entire county, but in 1942 there were several herds of 100 head or more. Raising of beef cattle should prove profitable, as they can be pastured most of the year.

In 1950, 9,327 hogs and pigs were on farms of the county, or 5,669 head fewer than in 1940. Most of the hogs are of mixed breeds and of inferior quality. They are owned principally by farm tenants.

Corn and other grains now grown in the county provide enough feed for the livestock raised. Formerly, part of the grain for livestock had to be brought into the county.

PERMANENT PASTURE

Permanent pastures occupy only a small acreage and are usually located near the farmstead. Most of the pastures are used for grazing the few dairy cows kept to produce milk for home use. Pastures are usually located for convenience; suitability of the soil is frequently not considered.

The restriction on acreage of cotton has encouraged development of better permanent pastures. Beef cattle have been chosen as a substitute for cotton on some of the farms; consequently, more attention has been given to soil suitability when establishing permanent pasture. The area of cropland used only for pasture increased from 3,521 acres in 1944 to 6,745 in 1949, or almost doubled.

TENURE AND SIZE OF FARMS

In 1950, tenants operated 91.2 percent of the farms, owners 8.3 percent, and managers 0.5 percent. Sharecroppers operate most of the large farms under the supervision of managers or riders. Under this "plantation" system, the farm owner or operator furnishes all equipment and work animals and advances credit for food and personal expenses. The operator receives from the sharecropper 50 to 60 percent of the cotton and interest on the money loaned.

Many tenants rent the land and furnish their own equipment and animals. Under this system the tenant usually keeps two-thirds of the cotton and three-fourths of the corn. Some tenants pay cash rent.

The 1950 census reported 4,579 farms in Tunica county, and the average farm was 49 acres in size. This small average size results because so many farms are operated by tenants, many of whom cultivate less than 10 acres. There are a few large farms. In 1950, 44 farms contained 500 to 999 acres and 46 farms contained a thousand acres or more. The largest land holdings usually are located on the most productive soils, which were cleared by the first settlers. Many of the small farms are located in the level backwater areas settled in recent years.

FARM EQUIPMENT AND FACILITIES

In 1950, 1,060 farms reported 1,308 automobiles; 399 farms, 537 motortrucks; and 240 farms, 830 tractors. This means that about 23 percent of the farms have automobiles and smaller percentages have trucks and tractors. Most of the large farms use tractors extensively, and a few use them exclusively. Except on freshly cleared farms, conditions are favorable for tractor farming.

Most of the owners and managers of large farms, and some of the small owners, have electricity in their homes. In 1950, 1,303 farms received electricity from a powerline. Main transmission lines are fairly well distributed, but access lines are limited. Telephones were reported on 80 farms in 1950.

LABOR

Farm labor is normally plentiful. The current market price and the lateness of the season govern the wages paid to laborers for picking 100 pounds of cotton. Higher prices per pound are paid in years when the market price is high. Wages are also higher late in fall when the cotton is dry and light and more difficult to pick.

GLOSSARY

[Most of the definitions in this glossary were taken from *Soils and Men* (12) or from the *Soil Survey Manual* (13)]

Acidity. The degree of acidity of the soil mass expressed in pH values, or in words, as follows:

Extremely acid.....	below 4. 5	Slightly acid.....	6. 1-6. 5
Very strongly acid.....	4. 5-5. 0	Neutral.....	6. 6-7. 3
Strongly acid.....	5. 1-5. 5	Mildly alkaline.....	7. 4-7. 8
Medium acid.....	5. 6-6. 0	Moderately alkaline.....	7. 9-8. 4

Alluvium. Fine material, as sand, silt, or clay, deposited on land by streams.

Clay. Small mineral soil grains, less than 0.002 mm. (0.000079 in.) in diameter.

Colluvium. Deposits of rock fragments and soil material accumulated at the base of slopes through the influence of gravity; in this area it includes creep and local wash, and the material is mixed.

Complex. A soil association composed of such an intimate mixture of areas of soil series, types, or phases that these cannot be indicated separately upon maps of the scale used and are therefore mapped as a unit.

Consistence, soil. The attributes of soil material that are expressed by the degree and kind of cohesion and adhesion or by the resistance to deformation or rupture. Terms commonly used to describe consistence are *brittle*, *claypan*, *compact*, *firm*, *friable*, *impervious*, *plastic*, *sticky*, *stiff*, and *tight*.

Brittle. The term used to describe a soil that when dry breaks with a sharp, clean fracture, or if struck a sharp blow, shatters into cleanly broken hard fragments.

Claypan. The layer or horizon of accumulation, or a stratum of stiff, compact, and relatively impervious clay.

Compact. Dense and firm but without cementation.

Firm. Resistant to forces tending to produce rupture or deformation.

Friable. Readily ruptured and crushed with application of moderate force; nonplastic.

Impervious. Very resistant to penetration by water and usually by air and plant roots; impenetrable.

Plastic. Readily deformed without rupture; pliable but cohesive; easily molded and puttylike; not friable.

Sticky. Adhesive rather than cohesive when wet, but usually very cohesive when dry. Soil shows a decided tendency to adhere to other materials and objects when wet.

Stiff. Resistant to deformation or rupture; firm and tenacious and tending toward imperviousness. Usually applied to condition of the soil in place and moderately wet.

Tight. Compact, impervious, tenacious, and usually plastic.

Contour tillage. Furrows plowed at right angles to the direction of slope, at the same level throughout, and ordinarily at comparatively close intervals.

Cropland. Land regularly used for crops, except forest crops. It includes rotation pasture, cultivated summer fallow, or other land ordinarily used for crops but temporarily idle.

Crumb. Generally soft, small, porous aggregates, irregular but tending toward a spherical shape, as in the A_1 horizons of many soils. Crumb structure is closely related to granular structure. (See also Structure, soil.)

Erosion, soil. The wearing away or removal of soil material by water or wind.

Forest. Land not in farms that bears a stand of trees of any age or stature, including seedlings (reproduction), but of species attaining a minimum average height of 6 feet at maturity, or land from which such a stand has been removed, but is not now restocking, and on which no other use has been substituted. Forest on farms is called farm woodland or farm forest.

Fertility, soil. The quality that enables a soil to provide the proper compounds, in the proper amounts and in the proper balance, for the growth of specified plants when other factors such as light, temperature, and the physical condition of the soil are favorable.

First bottom. The normal flood plain of a stream, part of which may be flooded only at infrequent intervals; land along a stream that is subject to overflow.

Genesis, soil. Mode of origin of the soil, particularly to the processes responsible for the development of the solum (horizons A and B) from the unconsolidated parent material. (See also Horizon, soil.)

Granular. Roughly spherical firm small aggregates that may be either hard or soft but are usually more firm than crumb and without the distinct faces of blocky structure. (See also Structure, soil.)

Great soil group (soil classification). A broad group of soils having common internal soil characteristics. It includes one or more families of soils.

Green-manure crop. Any crop grown and plowed under for the purpose of improving the soil, especially by the addition of organic matter.

Horizon soil. A layer of soil, approximately parallel to the soil surface, with characteristics produced by soil-forming processes.

Horizon A. The master horizon consisting of (1) one or more mineral horizons of maximum organic accumulation; or (2) surface or subsurface horizons that are lighter in color than the underlying horizon and which have lost clay minerals, iron, and aluminum with resultant concentration of the more resistant minerals; or (3) horizons belonging to both of these categories.

Horizon B. The master horizon of altered material characterized by (1) an accumulation of clay, iron, or aluminum, with accessory organic material; or (2) more or less blocky or prismatic structure together with other characteristics, such as stronger colors, unlike those of the A horizons or the underlying horizons of nearly unchanged material; or (3) characteristics of both these categories. Commonly, the lower limit of the B horizon corresponds with the lower limit of the solum.

Horizon C. A layer of unconsolidated material, relatively little affected by the influence of organisms and presumed to be similar in chemical, physical, and mineralogical composition to the material from which at least a portion of the overlying solum has developed.

Horizon D. Any stratum underlying the C, or the B if no C is present, which is unlike C, or unlike the material from which the solum has been formed.

Internal drainage. That quality of soil that permits the downward flow of excess water through it.

Leaching, soil. Removal of materials in solution.

Massive. Large uniform masses of cohesive soil, sometimes with ill-defined and irregular cleavage, as in some of the fine-textured alluvial soils; structureless. (*See also* Structure, soil.)

Morphology, soil. The physical constitution of the soil expressed in the kinds of horizons, their thickness and arrangement in the profile, and the texture, structure, consistence, porosity, and color of each horizon.

Mottling, soil. Contrasting color patches that vary in number and size. Descriptive terms are as follows: Contrast—*faint, distinct, and prominent*; abundance—*few, common, and many*; and size—*fine, medium, and coarse*. The size measurements are the following: *fine*, commonly less than 5 mm. (about 0.2 in.) in diameter along the greatest dimension; *medium*, commonly ranging between 5 and 15 mm. (about 0.2 to 0.6 in.) in diameter along the greatest dimension; and *coarse*, commonly more than 15 mm. (about 0.6 in.) in diameter along the greatest dimension.

Natural drainage. Refers to those conditions that existed during development of the soil, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may result from other causes, as natural deepening of channels or filling of depressions blocking drainage outlets. The following terms are used to express natural drainage: *excessively drained, somewhat excessively drained, well drained, moderately well drained, imperfectly or somewhat poorly drained, poorly drained, and very poorly drained*.

Normal soil. A soil having a profile in equilibrium or nearly in equilibrium with its environment, developed under good but not excessive drainage from parent material of mixed mineralogical, physical, and chemical composition, and expressing the full effects of the forces of climate and living matter.

Nutrients, plant. The elements taken in by the plant, essential to its growth, and used by it in the elaboration of its food and tissue. These include nitrogen, phosphorus, calcium, potassium, magnesium, sulfur, iron, manganese, copper, boron, zinc, and perhaps others obtained from the soil; and carbon, hydrogen, and oxygen obtained largely from the air and water.

Parent material. The unconsolidated mass from which the soil profile develops. (*See also* C horizon; Profile; Substratum.)

Permeability, soil. That quality of the soil that enables it to transmit water or air.

Phase, soil. A subdivision of the soil type covering variations that are chiefly in such external characteristics as relief, stoniness, or accelerated erosion.

Productivity, soil. The capability of a soil to produce a specified plant or sequence of plants under a given system of management.

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material. (*See also* Horizon, soil; Parent material.)

Relief. The elevations or inequalities of a land surface, considered collectively.

Sand. Small rock or mineral fragments with diameters ranging between 0.05 mm. (0.002 in.) and 2.0 mm. (0.079). The term sand is also applied to soils containing 90 percent or more of sand.

Series, soil. A group of soils having the same profile characteristics, and the same general range in color, structure, consistence, and sequence of horizons; the same general conditions of relief and drainage; and usually a common or similar origin and mode of formation. A group of soil types closely similar in all respects except for the texture of the surface soil.

Silt. Small mineral soil grains ranging from 0.05 mm. (0.002 in.) to 0.002 mm. (0.000079 in.) in diameter.

Single grain. Each grain taken alone, as in sand; structureless. (*See also* Structure, soil.)

Soil. The natural medium for the growth of land plants on the surface of the earth; composed of organic and mineral materials.

Structure, soil. The arrangement of the individual grains and aggregates that make up the soil mass; may refer to the natural arrangement of the soil when in place and undisturbed or to the soil at any degree of disturbance.

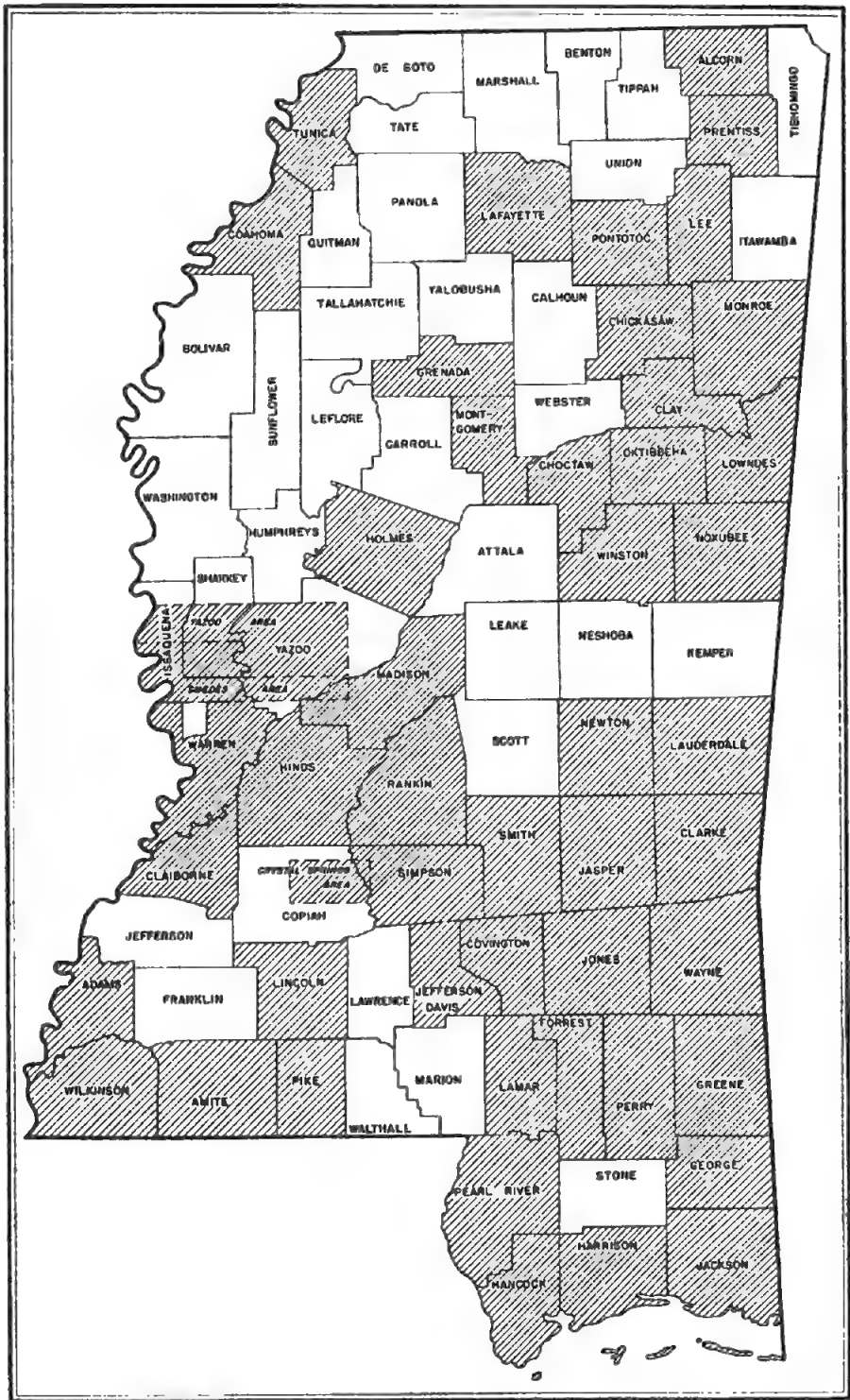
Subsoil. Technically, the B horizon; roughly, that part of the profile below plow depth.

Substratum. Material underlying the subsoil. (*See also* Horizon, soil.)

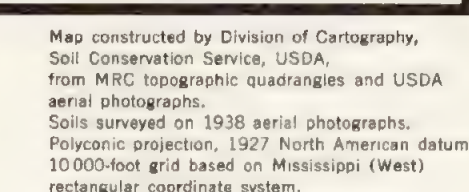
- Surface runoff.** Refers to the amount of water removed by flow over the surface of the soil. The amount and rapidity of surface runoff are affected by factors such as texture, structure, and porosity of the surface soil; the vegetative covering; the prevailing climate; and the slope. The degree of surface runoff is expressed by the terms *very rapid, rapid, medium, slow, very slow, and ponded*.
- Surface soil.** That part of the upper profile usually stirred by plowing; the A horizon.
- Terrace (geological).** An old alluvial plain, usually flat or smooth, bordering a stream, a lake, or the sea; frequently called second bottom as contrasted to flood plain; seldom subject to overflow.
- Texture.** Size of the individual particles making up the soil mass. The various soil separates, as sand, silt, and clay, determine texture. A coarse-textured soil is one high in content of sand; a fine-textured one contains a large proportion of clay.
- Type, soil.** A group of soils having genetic horizons similar as to differentiating characteristics, including texture and arrangement in the soil profile, and developed from a particular type of parent material.
- Upland (geological).** Lands consisting of materials unworked by water in recent geologic time and ordinarily lying at higher elevations than the alluvial plains.

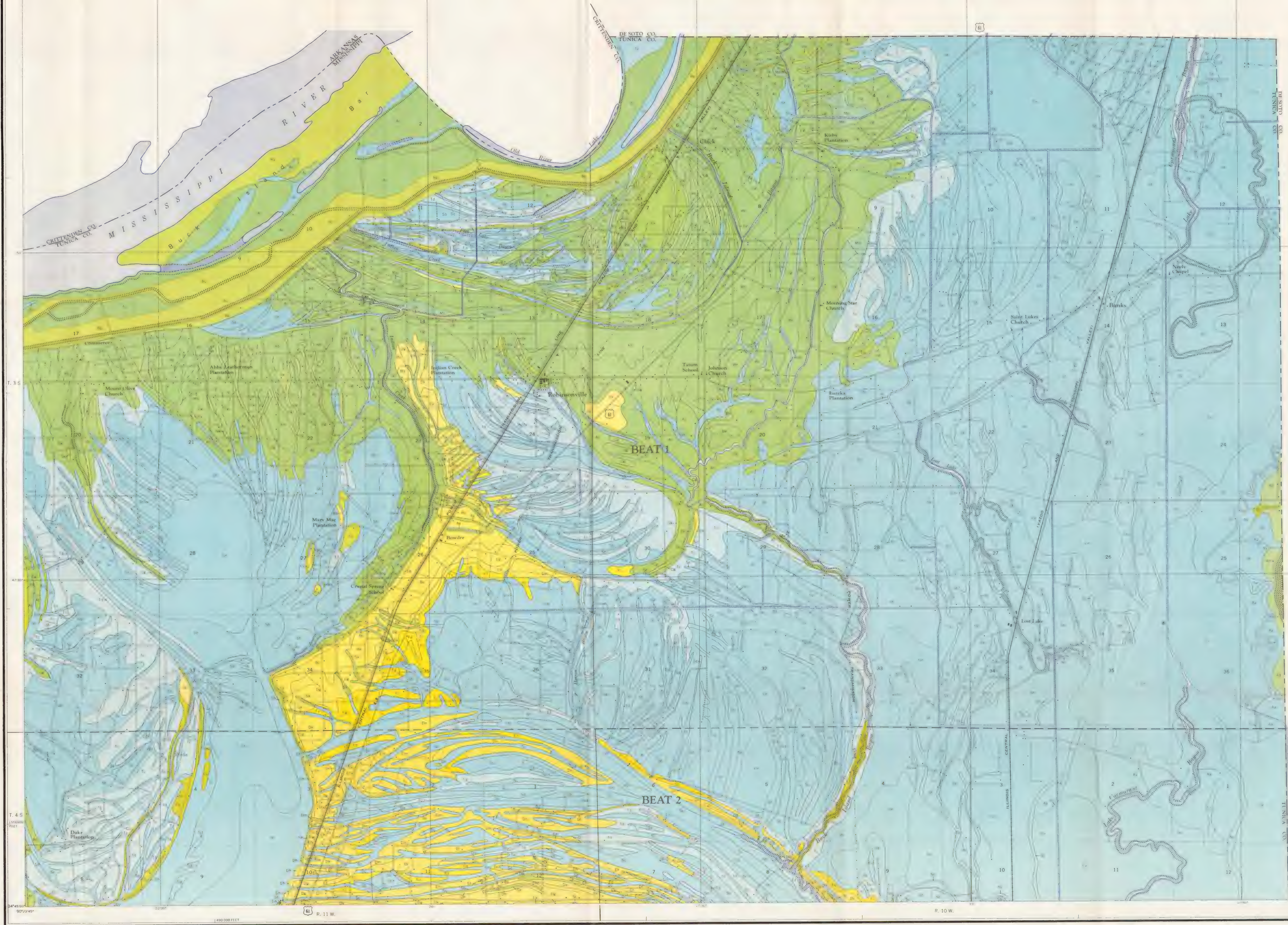
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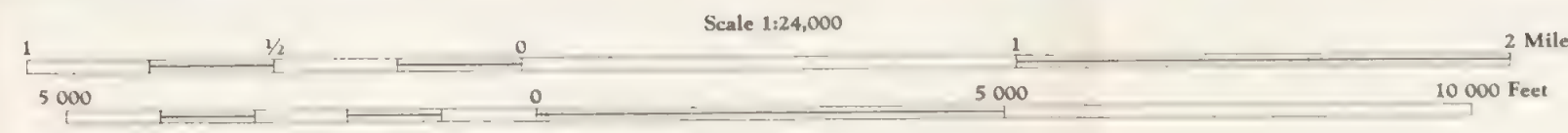


Areas surveyed in Mississippi shown by shading.

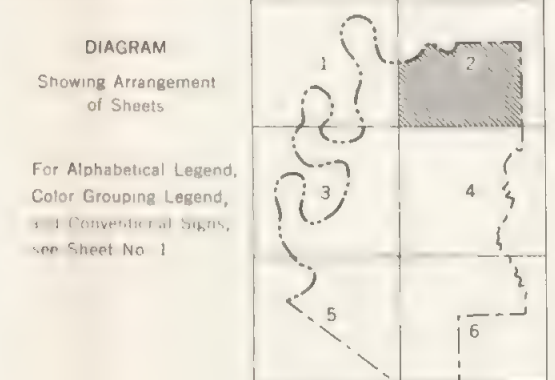




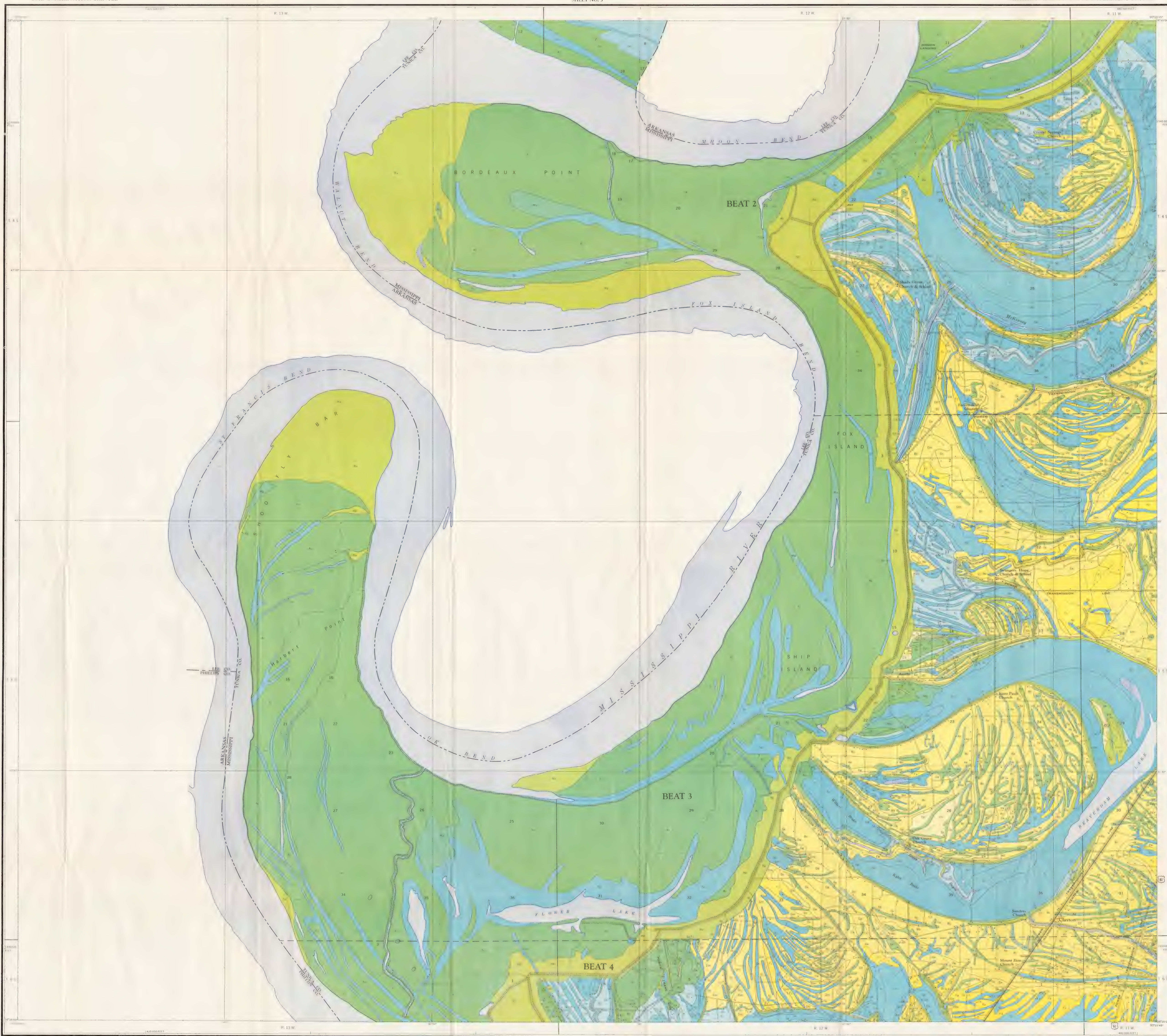
J. Hanson, Director, Chief Soil Classifier
R. H. Adams, Chief Mapping, Soil Data and Publication
Roy W. Simmons, Private Soil Classifier, Southern States
Also assisted by L. L. Harris, Senior Soil Classifier
Soils mapped 1940-42 by Thomas Flowers, in charge,
L. A. Tiedeman, J. A. Adams, and C. G. Morgan,
Mississippi Agricultural Experiment Station.



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Soils surveyed in 1938 aerial photographs.
Aerial photographs, 1937 North American Datum
1:50,000 feet grid based on Waterbury (WGS)
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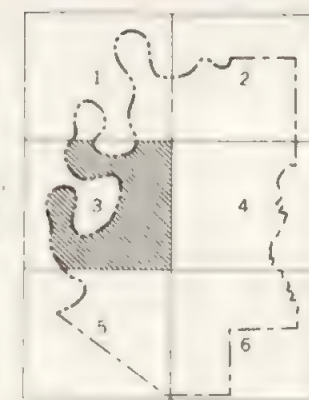


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Area inspected by L. L. Martin, Senior Soil Classifier.
Soils surveyed 1940-42 by Thomas L. Jones, in Charge.
L. A. Davidson, J. A. Heron, and C. G. Moran.
Mississippi Agricultural Experiment Station.

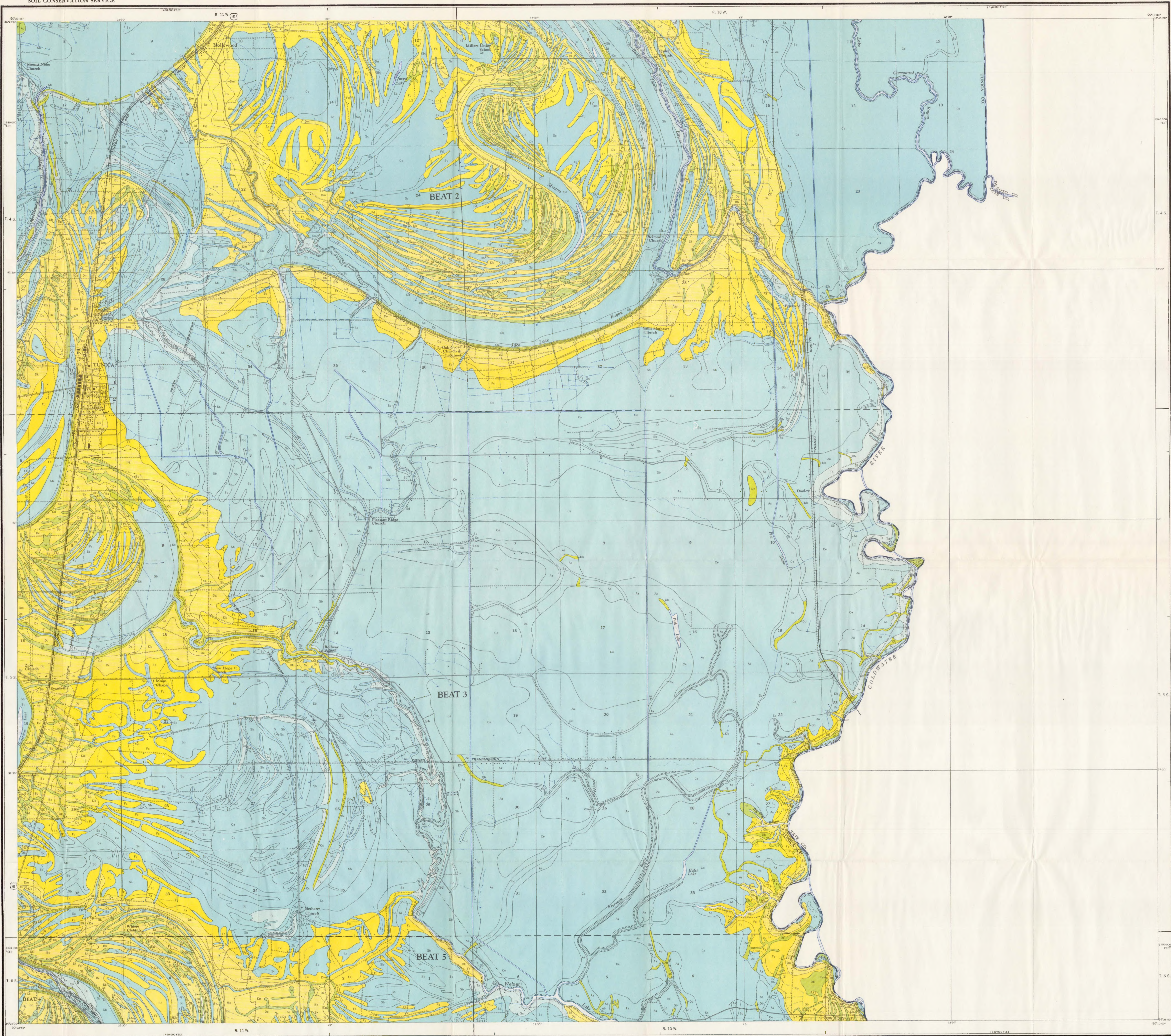
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For Additional Legend,
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Soils surveyed on 1948 aerial photographs.
Previous editions, 1927 North American Datum.
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map, rectangular coordinate system.

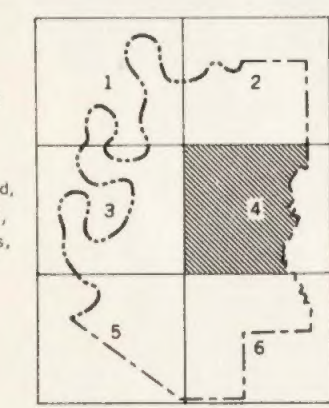


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Roy W. Simmons, Principal Soil Correlator, Southern States.
Area Inspected by: L. H. Martin, Senior Soil Correlator.
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L. A. Goodrich, J. A. Hines, and C. G. Morgan.
Mississippi Agricultural Experiment Station.

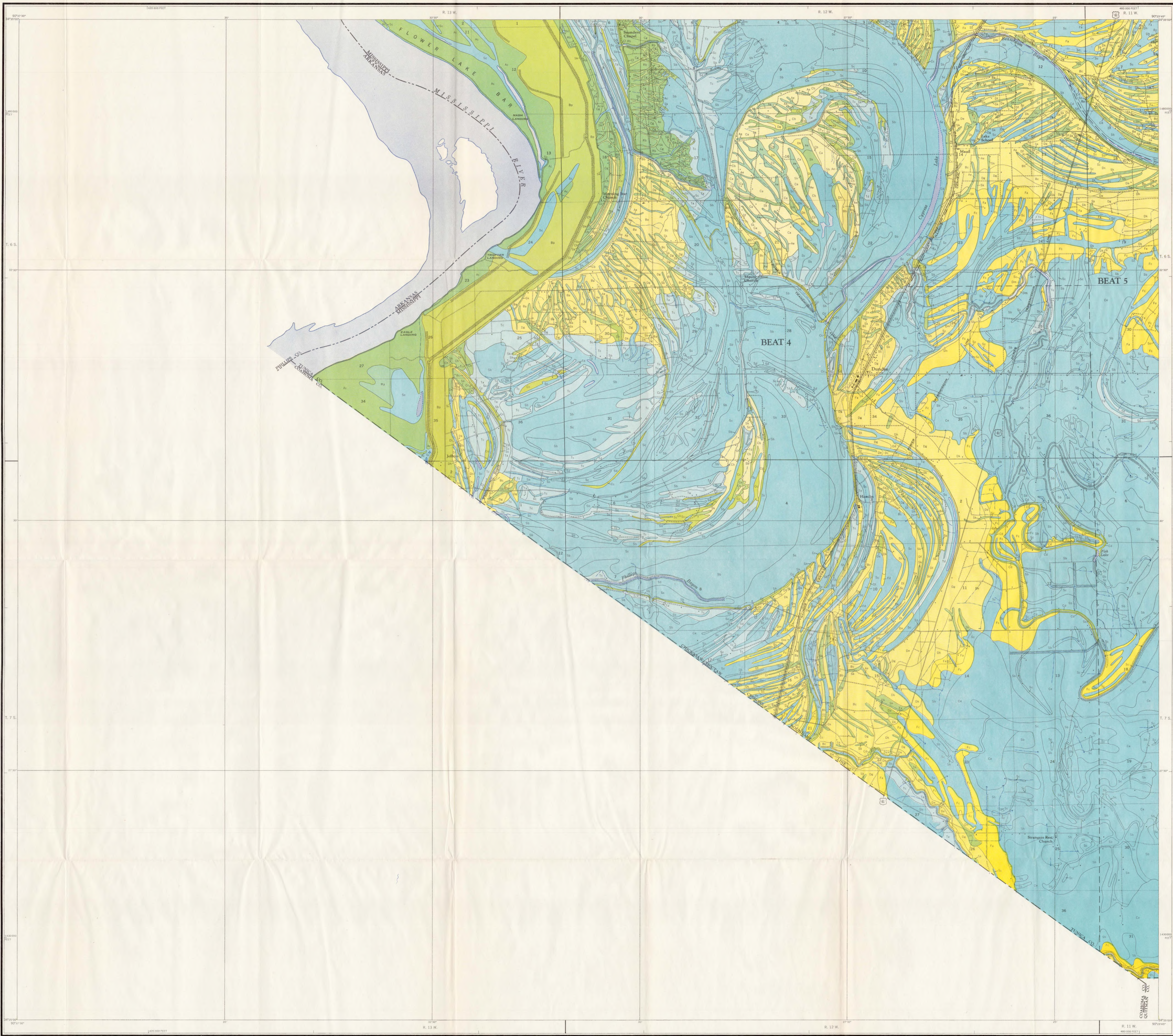
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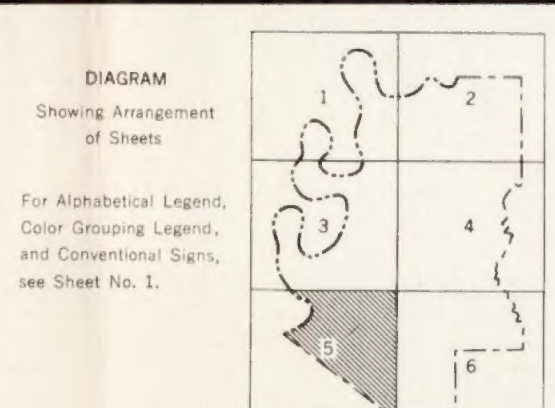
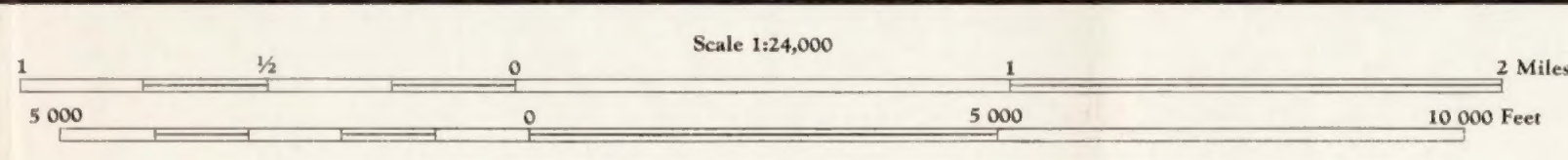
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Showing arrangement
of sheets
For Alphabetical Legend,
Color Grouping Legend,
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see Sheet No. 1.



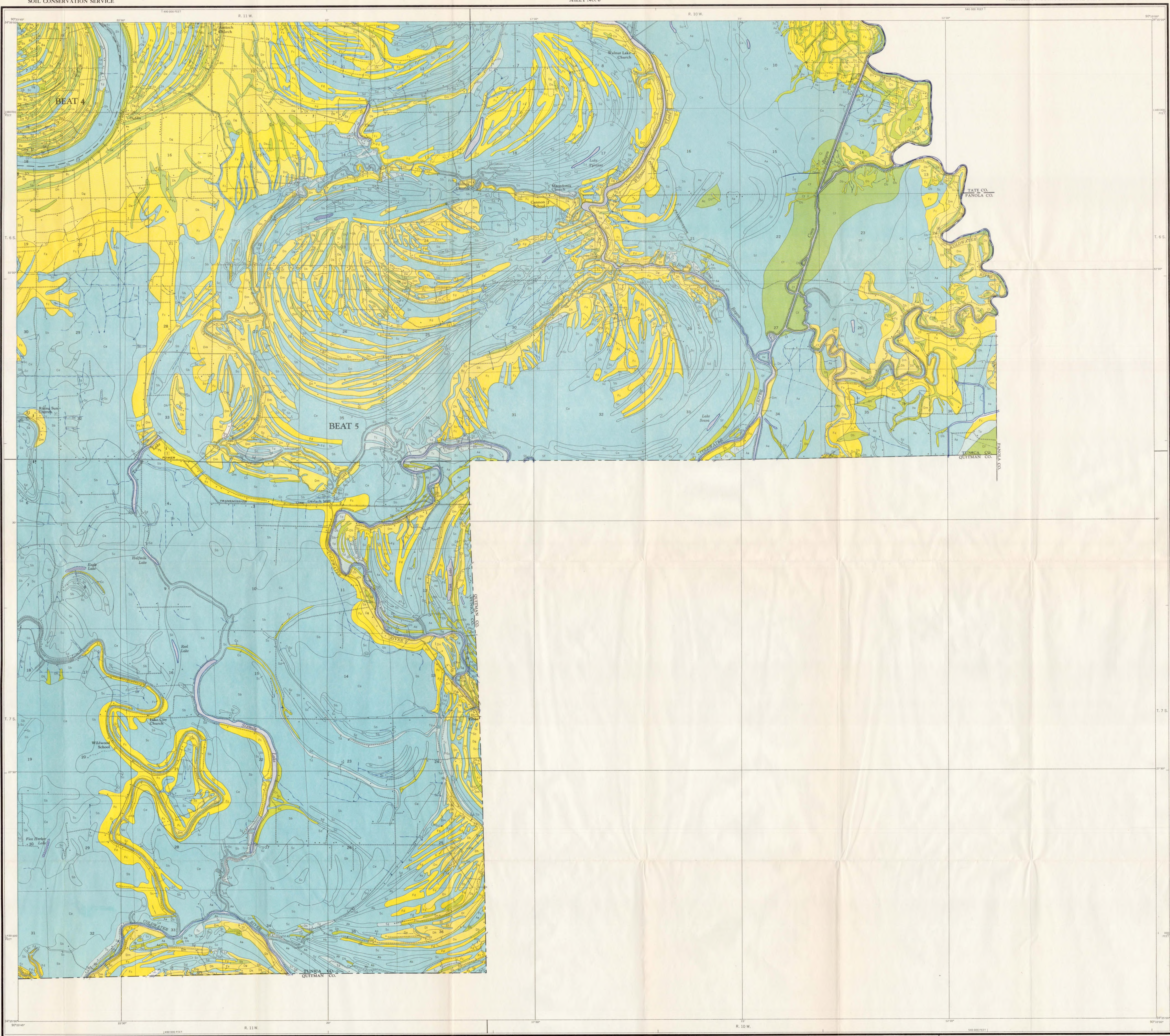
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Area inspected by L. L. Martin, Senior Soil Correlator
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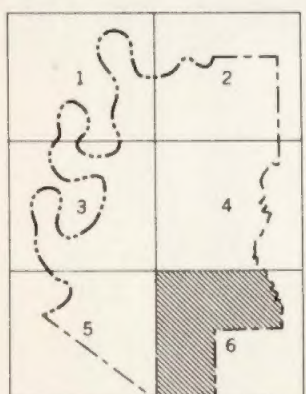


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Pictorial projection, 1927 North American datum,
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DIAGRAM
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Soils surveyed on 1938 aerial photographs.
Polyconic projection, 1927 North American datum.
1:50,000 feet and based on Mississippi (WGS84)
rectangular coordinate system.

SUPPLEMENT TO THE SOIL MAP OF TUNICA COUNTY, MISS., SHOWING IMPORTANT CHARACTERISTICS OF THE SOIL SERIES

Soil series	Topographic position	Surface soil					Subsurface soil						Underlying material— texture	Surface runoff	Water movement through soil	Drainage class
		Color	Texture	Consistence	Range in thick- ness	Acidity	Mottling	Dominant color	Texture	Consistence	Range in thick- ness	Acidity				
Alligator.....	Slack-water areas.....	Grayish brown.....	Clay.....	Very firm.....	<i>Inches</i> 3- 5	Medium acid.....	In places prom- inent.	Light gray mottled in places with gray, yellow, and brown.	Clay.....	Very firm.....	<i>Inches</i> 20-30	Medium acid.....	Clay.....	Slow to medium.	Slow to very slow....	Poor.
Alva.....	Depressions.....	Grayish brown or brown.....	Very fine sandy loam.....	Friable.....	6-10	Strongly acid.....	Prominent.....	Yellow, brown, and gray.....	Silt loam and very fine sandy loam.	Friable.....	10-30	Strongly acid.....	Silt loam.....	Slow to medium.	Medium.....	Moderately good.
Ark.....	Depressions.....	Dark gray to dark brown.....	Silt loam to sandy loam.....	Friable.....	10-12	Medium acid to neutral.	None.....	Dark brown or very dark brown.	Silt loam to fine sandy clay loam.	Friable.....	10-30	Medium to strongly acid.	Fine sandy loam to silt loam.	Medium to slow.	Medium.....	Good.
Bosket.....	Old natural levees.....	Light brownish gray or pale brown.	Very fine sandy loam or sandy loam.	Very friable or loose.	6-10	Slightly acid.....	None.....	Brown.....	Sandy clay loam or sandy loam.	Friable.....	36-40	Slightly acid.....	Sandy loam, fine sandy loam, or sandy clay loam.	Slow to medium.	Medium to rapid....	Good.
Bowdre.....	Recent natural levees.....	Very dark grayish brown.....	Silty clay loam to clay.....	Firm.....	4-24	Medium to very slightly acid.	Faint.....	Dark grayish brown or grayish brown.	Silt loam to sand.....	Friable to loose..	24-30	Medium to very slightly acid.	Very fine sandy loam.....	Slow to medium.	Medium.....	Moderately good.
Clack.....	Old natural levees.....	Pale brown.....	Fine sandy loam to loamy sand.	Loose.....	6- 8	Strongly acid.....	None.....	Yellowish brown.....	Loamy sand.....	Friable to loose..	36-40	Strongly acid.....	Loamy sand.....	Slow to medium.	Rapid to very rapid.	Excessive.
Collins.....	Recent natural levees.....	Light brown to grayish brown.	Silt loam.....	Very friable.....	6 -8	Medium acid.....	None.....	Pale brown.....	Silt loam.....	Very friable.....	18-20	Medium acid.....	Silt loam.....	Medium.....	Medium.....	Moderately good.
Commerce.....	Recent natural levees.....	Pale brown.....	Silt loam and very fine sandy loam.	Friable.....	6-12	Neutral to alkaline.....	Faint to prom- inent.	Pale brown mottled with gray, yellow, and brown.	Silt loam.....	Friable.....	20-24	Neutral to alkaline..	Silty clay loam or clay...	Medium.....	Medium to slow....	Moderately good.
Crevasse.....	Recent natural levees.....	Pale brown.....	Sandy loam.....	Loose.....	8-10	Neutral to alkaline.....	None.....	Pale brown.....	Loamy sand.....	Loose.....	30-40	Neutral to alkaline..	Loamy sand.....	Slow to rapid....	Medium to rapid....	Excessive.
Dowling.....	Depressions.....	Dark grayish brown.....	Very fine sandy loam, silt loam, or clay loam.	Friable to very firm.	3- 4	Slightly acid.....	Faint to prom- inent.	Light gray mottled with yellow and brown.	Clay.....	Friable to very firm.	36-40	Medium acid to neutral.	Clay.....	Very slow to ponded.	Very slow.....	Poor.
Dubbs.....	Old natural levees.....	Light brownish gray.....	Silt loam or very fine sandy loam.	Very friable.....	6- 8	Slightly acid.....	None or faint.....	Pale brown, gray, or yellowish brown.	Silty clay loam or sandy clay loam.	Friable.....	30-36	Medium to slightly acid.	Silt loam to very fine sandy loam.	Medium.....	Medium.....	Good.
Dundee.....	Old natural levees.....	Grayish brown.....	Very fine sandy loam to silty clay loam.	Friable to firm..	4-10	Strongly acid.....	Faint.....	Light brownish gray mottled with yellow.	Silty clay loam, silty clay, or clay.	Firm to friable..	28-30	Strongly acid.....	Silty clay loam to sandy clay or sandy loam.	Medium.....	Medium to slow....	Moderately good.
Eupora.....	Depressions.....	Light brown to pale brown.....	Silt loam or very fine sandy loam.	Very friable.....	6-10	Medium to strongly acid.	Distinct.....	Brown mottled with yellow and shades of brown.	Silt loam or very fine sandy loam.	Very friable.....	20-36	Medium acid.....	Sand to silty clay.....	Slow to medium.	Medium to slow....	Moderately good.
Forestdale.....	Old natural levees.....	Brownish gray to light brownish gray or pale brown.	Silty clay loam or clay.....	Friable to very friable.	4- 6	Strongly acid.....	Distinct.....	Light brownish gray mottled with yellow and brown.	Clay.....	Firm to friable..	20-24	Strongly acid.....	Silty clay, silty clay loam, or fine sandy clay loam.	Medium to slow.	Slow.....	Somewhat poor.
Mhoon.....	Recent natural levees.....	Pale brown.....	Silt loam.....	Very friable.....	4- 6	Neutral to alkaline.....	Distinct.....	Pale brown to light gray mot- tled with yellow, brown, and gray.	Silt loam or silty clay loam.	Friable.....	10-16	Neutral to alkaline..	Silt loam to silty clay loam.	Medium to slow.	Medium to slow....	Somewhat poor.
Robinsonville.....	Recent natural levees.....	Pale brown.....	Silt loam or very fine sandy loam.	Very friable.....	6- 8	Neutral to alkaline.....	None or faint.....	Yellowish brown.....	Silt loam or very fine sandy loam.	Very friable.....	30-40	Neutral to alkaline..	Loamy fine sand to silty clay loam or clay.	Slow.....	Medium to rapid....	Good.
Sharkey.....	Slack-water areas.....	Very dark gray.....	Silty clay loam to clay.....	Very firm.....	3- 4	Slightly acid to alka- line.	Faint to prom- inent.	Gray to dark gray mottled with yellowish brown.	Clay.....	Very firm.....	36-40	Slightly acid to al- kaline.	Clay.....	Slow.....	Very slow.....	Poor.
Souva.....	Depressions.....	Dark brown to dark gray- ish brown.	Silt loam.....	Friable.....	6-10	Medium acid to neutral.	Prominent.....	Gray or dark gray mottled with yellowish brown and light gray.	Silty clay loam.....	Friable to firm..	15-20	Medium acid to neu- tral.	Silty clay or clay.....	Slow to ponded..	Medium to slow....	Somewhat poor.
Tunica.....	Slack-water areas.....	Brownish gray to dark gray.....	Silty clay or clay.....	Firm to very firm.	4- 8	Slightly acid.....	Distinct.....	Dark grayish brown mottled with yellow, gray, and brown.	Silty clay or clay.....	Firm to very firm.	24-40	Slightly acid.	Silty clay loam to sandy loam.	Slow.....	Medium.....	Moderately good.